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CONTENTS—JULY, 1941

PRINCIPLES OF SURGICAL PRACTICE

Therapeutic Considerations in Acute Obstruction of the Small Bowel ROBERT T. CROWLEY, M D ,
and CHARLES G. JOHNSTON, M D , F A C S , Detroit, Michigan 1

COLLECTIVE REVIEW

A Survey of Estrogenic Dosage AUGUST A. WERNER, M D , St. Louis, Missouri 49

ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

Head

- LYONS, C. The Treatment of Staphylococcal Cavernous Sinus Thrombophlebitis with Heparin and Chemotherapy
HAUSENSTEIN, K. Practical Experiences and Critical Considerations in the Treatment of Gunshot Wounds of the Jaw

Eye

- PAEZ ALLENDE, F. The Surgical Removal of the Crystalline Lens without Iridectomy
DUGGAN, W. F. Acute Retrobulbar Neuritis as a Manifestation of Acute Localized Tissue Anoxia, Treatment with Vasodilators
DANDI, W. E. Results Following the Transcranial Operative Attack on Orbital Tumors
HAUSMAN, L. Surgical Treatment of Syphilitic Optic Atrophy

Ear

- LILLIE, H. I. The Diagnostic Significance of Partial Paralysis of the Facial Nerve in Chronic Suppurative Otitis Media and Mastoiditis
WILLIAMS, W. Otogenous Meningitis

Nose and Sinuses

- TEED, R. W. Primary Osteoma of the Frontal Sinus
AFONS, I. Neoplasms of the Antrum, Nasopharynx, and Hard Palate

Mouth

- KAZANJIAN, V. H. The Interrelation of Dentistry and Surgery in the Treatment of Deformities of the Face and Jaws
THOMA, K. H. The Use of Radiopaque Diagnostic Media in the Roentgen Diagnosis of Oral Surgical Conditions
BROWN, J. B., and BYARS, L. T. Malignant Melanomas

Neck

- HALDRE, J. Contributions on the Roentgen Therapy of Malignant Strumas Treated or Not Treated by Operation 13
JELKE, H. Hyperparathyroidism. A Case with Severe Kidney Changes, Treated by Parathyroidectomy 14
ARNOLD, W. Parathyroid Tumor with General Calcinosis 14
SWANBURNE, G. Chronic Laryngeal and Tracheal Stenosis 15
WILSON, G. E. The Diagnosis and Treatment of Tuberculosis of the Larynx and Contiguous Areas 15
PECK, W. S., MAXWELL, J. H., and LAMBERSON, F. Carcinoma of the Larynx. A Review of 170 Consecutive Cases 15
PENDERGRASS, E. P., and YOUNG, B. R. The Roentgen Diagnosis of Neoplasms of the Air and Food Passages, with Particular Reference to the Larynx 91
BELASCO, I. J., and MURLIN, J. R. The Effect of Thyroxin and Thyrotropic Hormone on the Basal Metabolism and Thyroid Tissue Respiration of Rats at Various Ages 101

SURGERY OF THE NERVOUS SYSTEM

Brain and Its Coverings, Cranial Nerves

- LILLIE, H. I. The Diagnostic Significance of Partial Paralysis of the Facial Nerve in Chronic Suppurative Otitis Media and Mastoiditis 9
WILLIAMS, W. Otogenous Meningitis 10
ZUELCH. Morphological Findings in Cases of Swelling of the Brain 17
SCHERER, H. J. Cerebral Astrocytomas and Their Derivatives 17
JENTZER, A., and JUNET, W. Surgery of the Hypophysis 18
WESTMAN, A., and JACOBSON, D. Endocrine Studies in Rabbits Following Section of the Hypophyseal Stalk 19
CAIRNS, H. Gunshot Wounds of the Head in 1940 81

LANDOLO C Hypophyseal Syndrome f T a mat c
Origin
ANTOGNETTI L a d PAT ONO V Th i flue ce f
Impla tat n f the Pit tary Gland th
Ur ary Elum at f a Substance P od c g
Hyperglycemia

Spinal Cord and Its Coverings

KRAYENBUCH H Di gnos a d Th apy f
Chro c Compression of th Spin l C rd w th
Spe l Emphas n Tum rs of the Cord

Peripheral Nerves

GIRARD V C Neu od c ti f the Uln N e in
th Elbow R gion

Miscellaneous

GRANT F C Su gic l Meth d f th R l f f Pa n
HAYSMAN L Su gic l Tre tment of Syphilis Opt c
Atrophy

SURGERY OF THE THORAX

Chest Wall and Breast

HINCHAY P R N ppl Discha ge A Ch se patho
l g al Study

S LAKESE E A St dy f Cases of T berc lo of
the Br st

SPOTO P A C ntnb ti n to Our Kn l dg f
Fibromas and Fbre my ma of th N pp

Trachea Lungs and Pleur

JACOBAEUS H C and B tce T A B h
p r m tric l Study n th Abity f th Huma
Lungs to S bstit for O e Another l
Pr hosprometrical Experim ts in Wh ch One
of th L es was C mpl ty C t Off from R
pirat l Bron hospromet al Experiment
w th B th Lungs Bre th g O e N t g d
the Other Oty n w th o w th Adm n
trat nt O L ng of Ca bo D od Su h
a C entrat n s to Pr t the G g Off f
Carbon D x def m the L g m Qu sti

CHADLER F G MASON G A LIVING TOE J L
Eow rd T nd Oth rs A Discu ss n th
T eatm t of T aum tic If moth ax

COLOSIMO C A Co tributo t the Radi l gic l
Study of Pulm nary At lectasis

HANRAHAN E M Ad us R and KLOPSTOCK R
The R l of Experim ntally Prod ed l t
pl ural Adh s n in Extral al Pn m ly
a d th Pre nts l S gical At l ctas
in Animals

D ARCANZO D Extral ural Pn m th fax

NEUFH H TOCKOFF A S W and HURSES A H
Th Su gical T e tm nt by Dra ge l S b
cut a d Chroni Putrid Abscess f th L g

BREA M M d TAIAN J A D gn s f the
Sur al D sord rs of th Fax Proce es d
Semi logic l Techniq e

CALCHI NO A I G Singl C g n l Cyt f th
Lu g

GOLDMAN A and STEPHENS H B Polypo d Bro
chial Tum rs 34
OCHSNER A and DEBAKEY M Ca m of the
Lung 35
PHILLIPS F J and ASANS W E Obl t rat on of
the Pl al Sp e Foli wing P eumon t my 37
HADDFIELD G and CHRISTIE R V Pulm n ry
C c on (Blast) D e to H gh Expl ve 82
THOMAS C P LIVINGSTONE J L BARRETT N R
ROB RTS J E H and Others D cu on n
Chest Inj ries 8
TSVETKOV V P Ro t g n p c A pects f P t
operat Pulm ary Compl at ns in R lat n 86
t Th r Ge es

Heart and Pericardium

SHEERAN H L d SUTH RL A D A M The
Pathology f H it D se s P gn y 60

Esophagus and Mediastinum

MOERSCH H J The T eatm nt of Esophage l
V ric by l ject f Scl oing Sol t 37

Miscellaneous

REIN E Hype f ction f th Thymu s D
Prelim ary Cl n cal Repo ts 37

SURGERY OF THE ABDOMEN

Therapeutic Co d r t n Acut Ob struct n f
the Sm ll B w l Ro rt T CROWLEY M D
a d CHARLE G JOHNSTON M D FACS
Det ot M ch ga

Abdominal Wall and Peritonium

B c ro G Two Hund d Un le t d Ope t for
l g ual Herni w th r Recu ce 39

LEVY J H a d PRUD E R Pr m y S c m f
th Om nt m R p r t f Ca 39

Gastrointestinal Tract

LINE K H Small H o h ges n the G tr l testu
linal Tract w th Sp cu al R f c t The R
l t t to Pse d m l s 40

TAYLOR H Pra tic l E l t n f G tr scopy
Ca in ma G st copy Dyspep ia M o al
Types Gast jej l Ul er 4

SERBER M NIK FF L V d SN Z F V P E
p rimental St des P l iat Ope t s fo
Perf rat d P pt c Ul rs 4

GLENN P M l te t al Ob trut R lt of
Tre tment w th the Use f l te t l l t bat 43

ERR L Int s sc pt o f the C l 43

WOOD G O R ect n f the Colon by f tu s sc p
t A One-Stag Int riorizatio Rou du
Re l t g n e d to End Ana t m rs 43

NASS U C F LORRY R W nd PLLA I E J
Tre tm t f App dic us at Fra kf d H p
tal A Thirty-Six l ar S r y e f 450 C 45

Liver Gall Bladder Pancreas and Spleen

BERNHARD F The P esent St tus of S g ry f th
Biliary Tr act 45

RICHTER, C P, and SCHMIDT, E C H, JR Increased Fat and Decreased Carbohydrate Appetite of Pancreatectomized Rats

102

Miscellaneous

SANDLER, B P Chronic Abdominal Pain Due to Hypoglycemia

47

GYNECOLOGY

A Survey of Estrogenic Dosage AUGUST A WERNER, M D, St Louis, Missouri

49

Uterus

LUCCHETTI, G Traumatic Perforations of the Uterus

55

HURDON, E Radium Treatment of Cancer of the Uterus

93

Adnexal and Peritoneal Conditions

WALLIS, O The Role of the Fallopian Tubes in the Spread of Pelvic Cancer

55

Miscellaneous

HOFFMAN, F, and TREITE, P Investigations of the Action of Female and Male Sex Hormones and Suprarenal Cortex Hormones on the Uterus

55

HENRIKSEN, E A Clinicopathological Investigation of the Causes of Menometrorrhagia

56

KENNEDY, W T Urinary Incontinence Relieved by Restoration and Maintenance of the Normal Position of the Urethra

56

HEYNEMAN, T Genital Tuberculosis in the Female

57

OBSTETRICS

Pregnancy and Its Complications

CASABONA, U Laboratory Investigations in Ectopic Pregnancy

59

PICCOLI, R The Existence of a Capsular Membrane in Tubal Pregnancy

59

ALBERS, H Pregnancy Edema

60

SHEEHAN, H L, and SUTHERLAND, A M The Pathology of Heart Disease in Pregnancy

60

Miscellaneous

STIEVE, H The Flow of Blood Out of the Intervillous Space of the Human Placenta

61

GIUFFRIDA, S Transabdominal Puncture of the Uterus for the Diagnosis of Hydatidiform Mole

61

PAGE, E W, PATTON, H S, and OGDEN, E The Effect of Pregnancy on Experimental Hypertension

62

GENITO-URINARY SURGERY

Adrenal, Kidney, and Ureter

JELKE, H Hyperparathyroidism A Case with Severe Kidney Changes Treated by Parathyroidectomy

14

BARNEY, J D, and JONES, G E Some Problems in the Management of Urinary Calculi

63

UHLE, C A W The Significance of Aneurysm of the Abdominal Aorta Masquerading as Primary Urological Disease Case Reports

63

Bladder, Urethra, and Penis

KENNEDY, W T Urinary Incontinence Relieved by Restoration and Maintenance of the Normal Position of the Urethra

56

ANSELMINO, K J Operative Restoration of a Large Defect of the Bladder Base, Bladder Neck, and Urethra

64

COUNCILL, W A A New Technique for Diverticulectomy of the Bladder

64

Genital Organs

SILLA, T Fifty Cases of Incomplete Descent of the Testicle Treated by Hormones

66

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

Conditions of the Bones, Joints, Muscles, Tendons, Etc

VOGT, J H Therapeutic Measures in Osteomyelitis and the Control of Their Efficiency

67

BRANDIS, H J on Subcutaneous Muscle Tears

67

SIEGLING, J A Growth of the Epiphyses

67

CRETIN, A Reflections on the Histogenesis of Bone in the Light of Studies of Delayed Consolidation

68

SMITH, A DeF Congenital Elevation of the Scapula

68

HIPPS, H E Muscle Pathology in Anterior Poliomyelitis, Its Relation to Function

68

GRAFF, U Disease of the Sacro-Iliac Joints, with Particular Consideration of the Inflammatory Diseases and Their Origin

70

LENGGENHAGER, K Concerning the Genesis, Symptomatology, and Therapy of the Subluxation Symptoms of the Knee Joint

71

MILONE, S, and MIDANA, A Recurring Hydrarthrosis of the Knee Due to the Virus of the Disease of Nicolas and Favre

71

SHANTY, A P The Clinical Picture and Treatment of Synovial Tumors

72

Surgery of the Bones, Joints, Muscles, Tendons, Etc

BLUM, L Partial Myotomy in the Treatment of Divided Flexor Tendons of the Hand

72

Fractures and Dislocations

URIST, M R, and McLEAN, F C Calcification and Ossification Calcification in the Callus in Healing Fractures in Normal Rats

73

WILLARD, DeF P, and NICHOLSON, J T Dislocation of the First Cervical Vertebra

73

CLARK, W A Fractures and Dislocations of the Cervical Portion of the Spine, with a Review of 89 Cases

75

BORNEBUSCH, K Aseptic Necrosis of the Head of the Femur after Fracture of the Neck in Childhood, and Its Relationship to Perthes' Disease

75

OTTOLENGHI, C F, and MAULUCCI, P T Fracture Dislocations of the Tarsal Scaphoid Bone

76

- WILE, U J, and HOLMAN, H H A Survey of 68 Cases of Extragenital Chancres 96
- HALDBO, H Tests of Vegetative Function after Post-Traumatic Dystrophy of the Extremities 96
- JANISCH-RAŠKOVIC, V Environment in Relation to Cancer Disposition and Cancer Age 97
- WEBB-JOHNSON, Sir A Pride and Prejudice in the Treatment of Cancer 99
- BARRETT, M K The Influence of Genetic Constitution upon the Induction of Resistance to Transplantable Mouse Tumors 100
- OVERGAARD, K, and OKKELS, H The Action of Dry Heat on Wood's Sarcoma 100
- Ductless Glands**
- IANDOLO, C Hypophyseal Syndromes of Traumatic Origin 100
- ANTONETTI, L and PATRONO, V The Influence of Implantation of the Pituitary Gland on the Urinary Elimination of a Substance Producing Hyperglycemia 101
- BELASCO, I J, and MURLIN, J R The Effect of Thyroxin and Thyrotropic Hormone on the Basal Metabolism and Thyroid Tissue Respiration of Rats at Various Ages 101
- RICHTER, C P, and SCHMIDT, E C H Jr Increased Fat and Decreased Carbohydrate Appetite of Pancreatectomized Rats 102
- PATRONO, V A Qualitative and Quantitative Study of Urinary Estrogens in Man 102
- FRAZIER, C N, and HU, C K Increased Resistance to Syphilis in the Rabbit Following Prolonged Administration of Urinary Estrogens I Feminizing Effects of Estrogens on Adult Male Rabbits II Character of the Reaction to Treponema Pallidum in Feminized Male Rabbits 102

AUTHORS OF ARTICLES ABSTRACTED

- Adams R 30
 Ad ms W E 37
 Agostinelli E 87 95
 Albers H 6
 Anselmino K J 64
 Antogni L 1
 Apkary P S 89
 Arnold W 14
 Ar s I 11
 Aufse A H 3
 B ggi G 39
 Barn y J D 63
 Barrett M K 00
 B r r t t \ R 8
 B lase I I 1
 B rnh rd F 45
 Bl ck D A K 79
 Bl m L 7
 Borneb ch K 75
 Br d H J 0 67
 Bre M M 32
 Brown A E 88
 B own J B
 Bru T 24
 Byars L T
 Ca rns H 8
 C lchu \ tti G 33
 Cas bon U 59
 Ch dle F G 5
 Christie R V 8
 Clark W A 75
 C l m C 9
 C un ll W A 64
 Cretzn A 68
 C o b e A 78
 Crowl y R T 1
 Da dy W E 9
 DeAr a gel D 3
 DeB k y M 35
 De Bla A 95
 Dugg W F 9
 Edw rds T 25
 E ba L 43
 Fr e C N
 G du V C 2
- G ffr d S 6
 Gl n P M 43
 Goldm A 34
 G n e k a t a \ 80
 Graff U 7
 C t F C 2
 H dfield G 8
 Haldbo H 96
 H l d e J 3
 Hamb g M 89
 H h n E M 3
 H u stein K 81
 H m n L 2
 H rksen E 56
 Herrell W E 88
 Heynemann T 57
 Hinchey P R 3
 Hipps H E 68
 Hoffma F 55
 H lm H H 96
 Holmes G W 9
 H ma J 77
 H eyburn J 9
 H C K
 H d E 93
 I dol C 00
 Is la A 9
 J cob u H C 24
 J cob hn D 9
 Janusch Rasko C V 97
 J lk H 4
 J ntzer A 8
 J ob ton C G
 Jon s G E 63
 Ju t W 8
 K za j a \ H
 K kw k A 87
 K n dy W T 56
 Klopsto k R
 K r y b hl H 2
 Lamberso F 5
 Le g nh g r K 7
 Levy J H 39
 L l e H I 9
 L nk K H 40
- L i g s t e J L 25 82
 Lo ty R W 45
 L cch ttu G 55
 Lyon C 8
 Maecht D I 78
 Maecht M B 78
 Ma r t t H L 87
 Maso G A 2
 Ma l l c i F T 76
 M x w ll J H 5
 M ycock W d A 87
 Mayneord W V 92
 M L n F C 73
 M d a n a A 71
 M lo e S 71
 Moersch H J 37
 M lm J R
 M t t P 77
 N s C F 45
 Neuh f H 32
 N ch lson J T 73
 Nik va O N 88
 No t chun k \ R 88
 Nyl d C E 9
 Ochs A 35
 Ogde E 6
 Ottol gh C F 76
 Okk l H 00
 Overgaard K 00
 Pae All de F 8
 P ge E W 62
 P tro V t 10
 P tt H S 6
 P ck W S 5
 P d gr E P 9
 Phillips F J 37
 P gnol R 59
 P u f a k i E J 45
 Pund F P 39
 R hn E 37
 Ri ht C P 02
 R be t J E H 8
 Ruegseg r J M 89
- S dl B I 47
 S vare E 23
 Sca bo gh H 78
 Scher H J 17
 Schmdt E C H Jr 1
 Schn d r L 89
 Ser brennik F L \ 42
 Sh n A P 7
 Sh h n H L 6
 S glung J A 67
 Slla T 66
 Smith A D F 68
 Smith A F 79
 S e k k v P 4
 Spoto P 3
 Stephe s H B 34
 St H 6
 S the la d A M 6
 S b rne G 5
 T ia a J A 32
 T ylo ff 4
 T ed R W
 Th ma K H 1
 Th mas C P 82
 Thompson J C 78
 T u e A S W 3
 Tre t P 55
 T tk \ P 86
 Uhle C A W 63
 U st M R 73
 V gt, J H 67
 Wallis O 55
 W bb-J h 50 S A 99
 Werne A A 49
 Westma A 9
 Wh tby L E H 87
 W l U J 66
 W llard D F P 73
 Williams H 0
 W l o G E 5
 W th T K 95
 Wood G O 43
 Y o g B R 9
 Z lch

CONTENTS—AUGUST, 1941

PRINCIPLES OF SURGICAL PRACTICE

Anomia—Its Surgical Significance HERBERT C. CHASE, M.D., F.A.C.S., New York, New York 105

COLLECTIVE REVIEW

The Bearing of the Gastric Secretory Mechanism upon the Surgical Management of Gastric and Duodenal Ulcer FREDERICK C. HILL, M.D., F.A.C.S., Omaha, Nebraska 133

ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

Head

PERRLELO, N. N. Facial Paralysis from Fracture of the Petrous Bone 121

Eye

MACNIE, J. P. Ocular Lymphogranuloma Venereum 121

Ear

ASHERSON, N. The Cochlear Nerve and the Vascular Theory of Nerve Deafness 121

MATIS, E. I. Practical Points in Transcondylar Radical Mastoidectomy 122

Mouth

IERRANDU, S. Allergic Factors in the Etiology and Symptomatology of Acute Abscess of the Tongue, Review of the Subject with Description of 3 Clinical Cases 123

HENSCH, C. Recommendations on War Surgery of Face Wounds 171

GANZLER, H. The Plastic Reconstruction of Tissue Losses Following Gunshot Injuries of the Face and Facial Bones 172

Pharynx

FISCHER, J., and GOTTFINK, F. Transient Bacteremia Following Tonsillectomy. Experimental Bacteriological and Clinical Studies 123

BULLO, E. Statistical Results of a Decade of Radiation Treatment of Tumors of the Tonsils 184

Neck

WULFF, H. B. The Treatment of Tuberculous Cervical Lymphoma, Late Results in 230 Cases Treated Partly Surgically, Partly Radiologically 123

PRESSMAN, J. J. Sphincter Action of the Larynx 124

SURGERY OF THE NERVOUS SYSTEM

Brain and Its Coverings, Cranial Nerves

MONNIER, M. The Functions of the Pineal Gland 126

PRATI, M. Clinical Statistical Report on 51 Patients with Craniocerebral Wounds—Spanish War 1936-1939 126

CAMMERMEYER, J. A Neuro-Anatomical Study of the Brain After Ligation of the Carotid Artery in a Case of Traumatic Pulverizing Exophthalmos 127

MORSON, S. M. The Diagnosis of Cerebellar Disease 127

PHILLIPS, G. The Surgery of Intracerebellar Disease 127

HORRAN, G. Favorable Types of Brain Tumor and the Results of Their Operative Removal 127

LAWIE, G. H., BROWDER, E. J., and WATSON, R. A Subdural Hematoma 128

ROSEMAN, L., and ARING, C. D. Lncephalopathy Associated with Sulfamethylthiazole Therapy 190

SURGERY OF THE THORAX

Trachea, Lungs, and Pleura

BIANCALANA, L. Thoricoplasty with Intrafascial Apicolysis 129

GALLONI, L. The Involvement of the Mediastinal Lymph Channels in Secondary Carcinoma of the Lungs 129

PRATI, M. A Clinical and Statistical Report on 193 Wounds of the Pleura and Lungs 130

HOCHBERG, L. A. A Study of 300 Cases of Acute Empyema Thoracis (132 Streptococci and 168 Pneumococci) 130

FREY, E. K. Gunshot Wounds of the Lung 173

Esophagus and Mediastinum

HEUER, G. J. Surgical Treatment of Tumors of the Mediastinum 131

BOMSKOV, C., and MILZNER, G. On the Question of Participation of the Thymus in Myasthenia Gravis Pseudoparalytica 186

Miscellaneous

- STANLEY S C Mass R d g rhy f th Che t f t
ff (Faculty of Rad l g t P es d ntial Add ss) 181

SURGERY OF THE ABDOMEN

- Th Bearing of th Ga tric Secret ry Mech nism upo
the Sig cal Managem t of Gast ca d Du f n l
Ul FREDERICK C HILL, MD F.A.C.S
Omaha Nebraska 133

Abdominal Wall and Peritoneum

- BERTI RISOLI R An Exp rim ntal St dy f th
Value f A ti P rit t c Sera 14
TUCI P Technical Points in Bass n Ope at n 14

Gastrointestinal Tract

- WEINTRAUB S and TUGGLE A D ode l Di e
ticul 43
ALLEN A W a d WELCH C E J J tomyfo th
R bef f Malf nctio ing G tro-Ente ost my
Stom 43
SPATOLISA O B f ple Occlu o of th I te tne
f m Volvul s f th Cec m nd Re procal C n
strict n of th Sm l l J test e a d Colo 44
DE QUERVAIN F O Half Century of App nd t 145
LUCCA E A Ch l nd H stop thol gic l C tri
b tio t the St dy f Ch ic Append iti 45

Liver Gall Bladder Pancreas and Spleen

- CARLI C A t lysis f th La r 46
MUELLER J C. T aumatic S c d ry Hemor hage
of th Spl e 146
LA MANNA S and SIVELLI A A C ntrib tio to
O r Knowl dg f th S g cal Dis ses f th
Sple n G e A n Synd om Due to Diffuse
H m lymph ng o E d theli m f th Spl n
w th T tal Disappe a e f the Splenic P e
chyma 47
PIGNATEL I G Rese ches n Pati nt Spl ecto-
mized Bec u f T auma 48
RO INSON W W O l Ch leyst graphy Th B si
f Sta d rdization of the M thod 8
STENSTRÖM B Chola gog aphy 8

GYNECOLOGY

Uterus

- SMITH F R N tion lity and Ca inoma f th Ce 49
CASHMAN B Z Th Role of Dep C t rizat n in
the Pre c tion f Ca e f th C ix 49
DARTMOUTH D N GRAHAM R J a d lvy A C Th
Phys lgy f th Ut s in Lab 5

Adrenal and Peritoneal Cystosis

- KAZANCI IL T R LAQUE W nd LAD A G P
P p llo E d th l m O r Report f 3 Cases
a d a Discuss n f Schill r Meso ephroma
Ov 49

Miscellaneous

- MAY R A War Inj s n W m n 149

OBSTETRICS

Pregnancy and Its Complications

- FAL S F H FREDA V C a d COHEN H H A
Skin Test f the Diagno of P g ncy 15
CLIVIO I Uncommon Ca s f E t a Uteri
P gn cy 5
G VELL S P g cy Tou o in Theory and
Practi 5
Labor and Its Complications
DANYORTH D N GRAHAM R J nd IVY A C
Th Phys lgy of th Uteri Labo 5
STU Y C Pos bilits Val a d Lim t t s of
M dical T e m e t of Int Ut A phyxia 15

Puerperium and Its Complications

- DE NDI S Th Beh ior f Serum Polypept d
the P erperal Stat 153
FRG WIS J The Bact r i l C te t f th Ut ri
Ca ty D g Co fi me t 53
PITKA EN H Op t e Co ct n f Ut Dis
pl m ntya d R ulta th U rs ty Clin
f W men at H ls ki n th Y ars 930-937 154

Newborn

- VALLE G Experim tal Study fa Resp rat r f th
D unke M rphy Type f th R imat n f
Asphyxiated I f ts 154

Miscellaneous

- McSWEENEY D J d Mo o r y A M r y
P lvm ty f G ne l U e 55
SCHULTZ K W A om l s Amo g Abo t
Th r O g a d Clin l gnific e 53

GENITO URINARY SURGERY

Adrenal Kidney and Urter

- MAJ NE A I Immed t nd Lat Res l t d
I r gnosis in W g w th f th K d y 57
BO N E N W nd HE KE H W Body S ct
Pyel grams Child 83

Genital Organs

- C T LANO C Expe m tal Hyp rti phy f th
Irost t 57

Miscellaneous

- MACN E J I Ocul Lymph granul m V re m t
SA TOIAN I G nd CA UTO L Th Tr tm t f
G rbe w th the S H pynd ne l p rat s
(M B 693) 157

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

Conditions of the Bones, Joints, Muscles, Tendons, Etc

- CANAVERO, M, and MAGGI, E Osteomyelitis from Anaerobic Pathogenic Micro Organisms 159
- BADO, J L, and LARGHERO IBARZ, P Osteoid Osteoma of Jaffe Comments on 2 Personal Cases 159
- BATTS, M, JR Periosteal Fibrosarcoma 160
- STRACKER, O Hallux Valgus 161
- WINFIELD, J M Anatomical Diagnosis of Injuries of the Hand 176
- ZIKEEV, V Treatment of Penetrating Knee Joint Injuries by Extension 177

Surgery of the Bones, Joints, Muscles, Tendons, Etc

- KOLODNER, I Immediate and Late Results of Primary Amputation of the Limbs 177

Fractures and Dislocations

- HILLS, R G, and WEINBERG, J A The Influence of Estrin on Callus Formation 161
- LAGOMARSINO, E H, and DAL LAGO, H Experimental Study of Rotatory Luxation of the Atlas 161
- SIEBNER, M The Treatment and End-Results of Fractures of the Radial Head 162
- STEPIN, S A Galeazzi's Fracture 175

SURGERY OF BLOOD AND LYMPH SYSTEMS

Blood Vessels

- BULLO, E A Supposed Active Movement of the Walls of the Peripheral Veins 163
- EFSKIND, L Conditions of Regeneration of the Intimal Epithelium after Suture of a Vessel 103
- KILLIAN, H Gas Gangrene and Blood-Vessel Injury 178
- SEIDS, J V, and HAUSER, H Aneurysm of the Splenic Artery 184

Blood, Transfusion

- TURNER, T B, and DISEKER, T H Duration of Infectivity of Treponema Pallidum in Citrated Blood Stored under Conditions Obtaining in Blood Banks 164
- JAKOBOWICZ, R, and BRUCE, L M The Iso-Agglutinin Titer of Pooled Serum or Plasma 164
- DIMITZA, A Disturbances of Blood Perfusion of the Extremities after Accidents 175

SURGICAL TECHNIQUE

- ANOVIA—Its Surgical Significance HERBERT C CHASE, M D, F A C S, New York, New York 105
- War Surgery
- PRATI, M Clinical-Statistical Report on 51 Patients with Craniocerebral Wounds—Spanish War 1936-1939 126
- PRATI, M A Clinical and Statistical Report on 193 Wounds of the Pleura and Lungs 130

- MAYER, A War Injuries in Women 149
- SABATINI, G, and others Symposium on Injuries Caused by Congelation 166
- URJOHN, W G D Military Surgery 167
- GEISTHOEVEL, W War Experiences from the Surgical Division of a Base Hospital 169
- KIRSCHNER, M Imbedded Missile Traumatism Operative Removal of Imbedded Missiles 169
- RITTER VON BAEYER, H The Problem of War Amputations 171
- HENSCHEN, C Recommendations on War Surgery of Face Wounds 171
- GANZER, H The Plastic Reconstruction of Tissue Losses Following Gunshot Injuries of the Face and Facial Bones 172
- TREY, E K Gunshot Wounds of the Lung 173

Operative Surgery and Technique, Postoperative Treatment

- KOGAN, I S Homoplastic Transplantation of Fascia 174
- HILL, D K The Determination of Blood Volume in Shocked Patients 174
- Antiseptic Surgery, Treatment of Wounds and Infections
- DIMITZA, A Disturbances of Blood Perfusion of the Extremities after Accidents 175
- STEPIN, S A Galeazzi's Fracture 175
- WINFIELD, J M Anatomical Diagnosis of Injuries of the Hand 176
- KOLODNER, I Immediate and Late Results of Primary Amputation of the Limbs 177
- ZIKEEV, V Treatment of Penetrating Knee Joint Injuries by Extension 177
- HETZAR, W The Avertin Treatment of Tetanus 177
- KILLIAN, H Gas Gangrene and Blood-Vessel Injury 178
- EINAUDI, M Chronic Myositis and Tendosynovitis Due to Staphylococci 179
- KEY, J A, and FRANKEL, C J The Local Use of Sulfanilamide, Sulfapyridine, and Sulfamethylthiazol 179

PHYSICO-CHEMICAL METHODS IN SURGERY

Roentgenology

- WEINTRAUB, S, and TUGGLE, A Duodenal Diverticula 143
- McSWEENEY, D J, and MOLONEY, A M X-Ray Pelvimetry for General Use 155
- BRILSFORD, J F Cysticercus Cellulose—Its Roentgenographic Detection in the Musculature and the Central Nervous System 181
- SHANKS, S C Mass Radiography of the Chest, Et Al (Faculty of Radiologists Presidential Address) 181
- ROBINSON, W W Oral Cholecystography, The Basis of Standardization of the Method 182
- STENSTROM, B Cholangiography 182
- BOURNE, N W, and HEFKE, H W Body-Section Pyelograms in Children 183
- SEIDS, J V, and HAUSER, H Aneurysm of the Splenic Artery 184

- BULLO F. Statistical Results of a Decad of Radiation Treatment of Tumors of the Throat 184
- SNELL, C. D. Indication by Roentgen Rays of Hereditary Changes in Mice 184

MISCELLANEOUS

- Clinical Entities—General Physiological Conditions
- CALM M. d Woods P. W. A Study of Vitamin C in the Croup of School Children 186
- BASOV C. d MILLER C. On the Question of Participation of the Thymus Myasthenia Gravis pseudoparalytica 186
- LOBL L. The Significance of Hormones in the Origin of Cancer 186
- PRICOLE V. A Contribution to the Study of the Malignant Tumors of Children 187
- ADSON W. A. Disease of the Mammary Gland 187
- DECHLOSKY T. Malnutrition in the Adult 188
- LIBERTY R. Does the Acute Viral Lymphoglymphoma Exist 188
- WOLFE S. A. REZICK S. d CUNNINGHAM L. Early Diagnosis of Malignant Metastases of the Spine 189
- TRIZZI F. P. An Aggressive Blastoma of the Glandular Tissue 190

- General Bacterial Protozoan and Parasitic Infections
- OMEARA R. A. Q. A New Concept of the Treatment of Diphtheria by Modern Antitoxin and Antitoxin 190
- ROSEMAN F. d WELCH C. D. Endophthalmitis Associated with Syphilis 190

Ductless Glands

- FELLOS K. v. O. Changes in the Treatment of the Male with Synthetic Estrogenic Substances 190
- MERK J. J. B. d C. R. The Effect of the Testosterone Stimulant in the Male and Female with the Luteal Phase of the Menstrual Cycle 190
- CREECH R. R. d BRYAN J. I. The Role of the Sympathetic Nervous System in the Production of the Sympathetic System 190

Hospitals Medical Education and History

- Fifty Years of Surgery Review of the Fifty Years of Surgery 191
- HUNTER J. B. The Emergency Medical Services 191
- KELLY C. Seminars in the History of Surgery 191

CONTENTS—SEPTEMBER, 1941

SURGERY AND THE BASIC SCIENCES

- The Peripheral Circulation Including the Lymphatics SMITH FREEMAN, M D , Ph D , and
FRED S GRODINS, M S , M B , Chicago, Illinois 195

COLLECTIVE REVIEW

- The Surgical Management of Diverticulitis of the Colon HAROLD LAUFMAN, B S , M D ,
Chicago, Illinois 222

ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

Head

- BOLDREY, E, and McNALLY, W J Chordoma of the
Basiocciput and Basisphenoid, Report of 4
Cases 206
KAZANJIAN, V H Treatment of Benign Tumors of
the Jaw 206
BAILEY, H The Treatment of Tumors of the Parotid
Gland, with Special Reference to Total Parotid-
ectomy 206
KJELLBERG, S R Radiological Treatment of Epulis 293

Eye

- McKEE, S H Malignant Melanoma of the Uveal
Tract, An Analysis of 42 Cases 207
DANDY, W E, and FOLLIS, R H, JR Carotid-
Cavernous Aneurysms 216
GILLAN, R U The Experimental Roentgenography
of Small Fragments of Glass in Relation to the
Human Eye 286

Ear

- GROVE, W E An Evaluation of the Meniere Syn-
drome 207
LINDSAY, J R Chemotherapy in the Treatment of
Complications of Acute Middle-Ear Suppura-
tion (Petrositis and Meningitis) 208

Mouth

- LEHMANN, J Carcinomas of the Lips and Tongue,
with Special Consideration of the Cases Treated
at the University Surgical Clinic in the City of
Freiburg During the Years from 1928 to 1938 208

Neck

- LAHEY, F H, and NELSON, H F Branchial Cysts
and Sinuses 209

- FARJAT, F P Thyroid Perichondritis with Descend-
ing Abscess of the Neck and Mediastinitis 210
KASPAR, F The Treatment of Postoperative Reac-
tions of Patients with Basedow's Disease 210
RASMUSSEN, H Influence of the Thyroid Hormone
on the Heart and Circulation 211
KELLY, J D Surgical Treatment of Bilateral Paral-
ysis of the Abductor Muscles 212
JACKSON, C L Laryngofissure for Cancer of the
Larynx, Observations Based on a Series of 50
Consecutive Cases 212

SURGERY OF THE NERVOUS SYSTEM

Brain and Its Coverings, Cranial Nerves

- McINTYRE, A K The Physiology of the Cerebellum 214
DENNY-BROWN, D Delayed Collapse after Head
Injury, Case Records 214
RUSSELL, D S, and FALCOVER, M A Antiseptics
in Brain Wounds, An Experimental Study of the
Histological Reaction of Cerebral Tissues to
Various Antiseptic Solutions 214
LATHAM, O Some Notes on the Pathology of the
Cerebellar System 215
DANDY, W E, and FOLLIS, R H, JR Carotid-
Cavernous Aneurysms 216
QUINLAND, W S Tuberculoma of the Cerebrum,
Report of a Case 216
SORGO, W The Results of Surgical Treatment of
Brain Tumors 216
ROMANO, N, and EYHERABIDE, R A Some Neuro-
logical Pictures Due to Metastasis of Pulmonary
Cancer 217

Peripheral Nerves

- THOMPSON, G C V Paralysis of the Serratus An-
terior Muscle Complicating Dislocation of the
Shoulder 264

Miscellaneous

DE K W Th S g al Man geme t f Hyperte
107

SURGERY OF THE THORAX

Chest Wall and Breast

SCHERCK S G Th M ng ment of Ca c r f th
Breast w th P Operat nd P t p rati
I radiat

Trachea, Lungs, and Pleura

R M L N O d EYHERABIDE R A Som Neur
I g cal P tures Due t M ta tasis f Pulm ary
C n c r

MOOD O W F Lobect my in Case f I j ry t
the Hulum f th Lu g Kepo t of Case

SINGER J J Jo es J C and TRA ERMAN L J
Asept c P l uritis Experim tally Prod ed

RECIERI E Abd minal P l tho i th P tho
genesis f the Ac te Abd minal Sy drom of
P l ur p lm ary D se se

Heart and Pericardium

RASMUSSEN H Infl en f th Thy d Horm
on th H ts d Circulat on

MOHR H Lat Res lts in a Ca f St e f the
H rt w th L g t n of th D ding Branch
of th Left Coro ry A t ry

MATIER A M Roentg o py s Di g ot c ad
in C ron ry Occl n A Study f 64 Cases

RAMOS J d ORIA J Symp t m t l gy d Histo
p th l gy f the Heart in Pati ts th
M ga Esoph gu a d M gacol n

Esophagus and Mediastinum

KAMPFER R H d Jo es E Esophage l Ob-
stru t Det G mm f th Esophagu d
Diaphragm

STRATTONS M Tra sth ra R ntg Tre t
ment f Ca er f the Esoph gu

Miscellaneous

PHILLIPS F J Ad m W E nd Hnd L S
Phys l g cal Adj tme t S bl th l R duc
t n f the L ng Cap ty: Dogs

PHILLIPS F LIVINGSON E H M d A MS W
E A Ch l Co d rati n f A esthesia
I trath ra Operat ns

SURGERY OF THE ABDOMEN

The Surg cal M geme t f Di erticul ti f th
C l Ha LO LAT r m B b M D Chi c
Illnois

Abdominal Wall and Peritoneum

JINGHA S H nd JULIEN S D M Cl of
Larg H rmal Apert res by Sk Flap Fla t c
Ope t

MOORE T Mesenteric Vascu Oc lus

Gastro-Intestinal Tract

REICH N E Ga tr D ert cul 24

LA CAVA G Bihrubinemu i It S en fca ce i 25

Gastro-Intestinal Ul r d C l tus

SCHATT NEKER J C P F tal Bl ed g from G trn 236

D od I U l rs

NISS B The Results f G tr Resect n f Pe 236

I rat of Castruoduo l Ulce

PETRI S a d JE SE T s H Experimental Stud 291

n the Pod tio of P n u A mia by

Operati n on the Dge t e Tract I S rvey f

the Res lts f T tal Gastr ctomy a d Resect n 237

f the Stom ch

DE GARIS C F T pography nd D l pm nt f 37

the Cecum Appe d

M SOY M L ALLEN H S QUEEN F B d 220

GIBBS E W A Re w of 600 C secuti

Appe dct m s 238

ROSE T F Retropo tio of the Tra erse C l 22

C mplicated by lleocecal Volvul A Repe t

of Ou Case w th Reco ery and R e f the 29

Literature

GABRIEL W B Sq am u-C l l Carcin m f th 244

Anu d A l C nal A naly s of 55 Cases

GOLDEN R Ab minal s of the Small I testin an 240

N trit l Dist b es Som Observat n n

Their Phys of g c l B s 287

ARCHER V W d COOF G Jr I tra Ab- 211

d minal I rma Int tinal I rc ati

Tw v nified Case Pr Operati ly Diagn sed 288

RAMOS J d ORIA J Symp t m t l gy d Histo 20

p th l gy of th H t l Pati t th Mega

Esophagu d Mega lo 286

Liv Gall Bl dd Pancre s and Spleen 99

RICHARDS R K d APP L M Th Barb t t 94

nd the L r

LUCIA S P and AGGELER P M Th I fl en e f 24

La Dam ge th Pla ma Prothromb C

cc tati d the Respo t V t min k 24

ZOLL GER R Ac t Ch leystitus 41

MARTEN S K St d s on the Du l gy f Gall 41

St es

OGILVIE R F D od nal D t c l d Th t 41

C mplic t ns w th Partu ul r R f e c t

Acut Pa e t u Nec s 43

KE ED H E P pl l ry Cystad ocarci m f 43

th P cea

Miscellaneous 84

ROGGIERI E Abd minal llet h the P th 84

g esis f th Acut Abd m al Syndrome f

l l p lm n ry D se e 44

McCULLO G J A L s d SUT ERLAND C C 81

I t a Abd m l Cal th ti Th I t r p ta

tio f Its Roe tgen l g cal M d tati n 81

GYNECOLOGY

Uterus

SCHMITZ H E d SHREHA J F F A E d 34

R ulta in C rical Ca in m T ted w th 34

Rad m d 800 Kil v lt Roe tg R ys 93

Adnexal and Peritoneal Conditions

- STRASSMANN, E O The Theca Cone and Its Tropism Toward the Ovarian Surface, a Typical Feature of Growing Human and Mammalian Follicles 245
- ORSÓS, F Obliterating Hematosalpinx 245
- LÖFSET, J Subsequent Investigations of Patients Operated upon at the Clinic from 1928 to 1938 for Sterility Due to Tubal Occlusion 246
- WALTER, R I, BACHMAN, A L, and HARRIS, W The Treatment of Carcinoma of the Ovary Improvement of Results with Postoperative Radiotherapy 292

External Genitalia

- BERVEN, E G E One Hundred and Seventy-Seven Cases of Primary Carcinoma of the Vulva 246

OBSTETRICS**Pregnancy and Its Complications**

- VOEGE, A, and SCHNEEHAGEN, H A Contribution to the Question of the Intra-Uterine Transmigration in Tubal Pregnancy 249
- KISIMOTO, S, OKAI, K, and YORIHUJI, T Intra-Abdominal Hemorrhage from Spontaneous Rupture of Subserous Blood Vessel of the Uterus During Pregnancy 249
- NEUWEILER, W Polyneuritis during Pregnancy 249

Labor and Its Complications

- CORNELL, E L Objections to Induction of Labor in Normal Pregnant Women 250
- WIESSMANN, A Labor in Contracted Pelvis 250
- SHELDON, C P Pelvic Delivery under Local Infiltration Anesthesia 251

Puerperium and Its Complications

- ARBOGAST, W, and EMBACHER, E M The Treatment of Puerperal Tetanus The Report of a Cured Case 252

Newborn

- THOMPSON, W B, and KRAHULIA, L J Resuscitation of the Newborn 252
- BRANDER, T The Frontal Fontanel Bone 253

Miscellaneous

- DE SNOO, K Pregnancy, Labor, and the Puerperium in the Macacus Cynemalgus 253

GENITO-URINARY SURGERY**Adrenal, Kidney, and Ureter**

- CAMPBELL, M F Injuries of the Kidneys 255
- LOWSLEY, O S, and MENNING, J H The Treatment of Rupture of the Kidney 255
- CAMPBELL, M F Ureterocele 255
- SPEACE, H M Stones at the Ureteropelvic Junction 255

- BLWATERS, E G L, BEALL, D, BELSEY, R H R, MILES, J A R, and Others Crush Injuries with Impairment of Renal Function 270

Bladder, Urethra, and Penis

- KIMBROUGH, J C The Treatment of Bladder Diverticulum 255
- MICHELETTI, G Total Inversion of the Bladder, a Pathogenetic and Clinical Contribution 257

Genital Organs

- CAMPBELL, E W The Significance of Hypertension in Prostatism with Chronic Urinary Retention 257
- LOWSLEY, O S, and KILGORE, R N Total Perineal Prostatectomy, A Modification of a Previously Published Technique 257
- MATHE, C P Thrombo-Angitis Obliterans (Buerger's Disease) of the Spermatoc Arteries, Report of a Case 259

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS**Conditions of the Bones, Joints, Muscles, Tendons, Etc**

- LOI, L Acute Osteomyelitis Followed up by Roentgen Examination During the Course of Conservative Biological Treatment 260
- DICK, G F, HUNT, L W, and FERRY, J L Calcification of the Supraspinatus Tendon, A New Treatment 260
- FRICK, J F von Tuberculosis of the Spine and Its Cure 260
- MARBLE, H C Purposeful Splinting Following Injuries to the Hand 279
- CHILDRESS, H M Subfascial Hematoma as a Complication of Crushing Injuries to the Foot 280
- ALEX, O The Value of Arthrography of the Shoulder Joint 288

Surgery of the Bones, Joints, Muscles, Tendons, Etc

- HENSCHEN, C The Treatment of Paget's Osteitis Deformans 262
- FIOCHIETTO, R, and URIBURL, J V Tuberculosis of the Elbow Operative Treatment and Technique of Economical Resection with Arthrodesis 263

Fractures and Dislocations

- THOMPSON, G C V Paralysis of the Serratus Anterior Muscle Complicating Dislocation of the Shoulder 264
- BERTOLA, V J, and ORDOÑEZ FERREYRA, H Treatment of Fracture of the Patella 265
- ROSSBACH, A F The Treatment of Fractures of the Lower Leg, with Special Attention to Boehler's Method 265
- DEBRUNNER, H Gunshot Fractures 272

SURGERY OF BLOOD AND LYMPH SYSTEMS

- The Peripheral Circulation Including the Lymphatics SMITH FREEMAN, M D, Ph D, and FRED S GRODINS, M S, M B, Chicago, Illinois 195

Blood Vessels

- MATHÉ C P Th mb Ang itis Obl tera s
(B erg r's D sease) of the Sperm tic Art nes
R p o t f a C s
- GRITZESCU C I nd ROBACK J Th Nut t o f
th A terial Wall A Normal a d P th logical
St dy of the Htophysiol gy in R l t n to
S gical T eatment d t the P thoge is of
Art n l Diseases

Blood Transfusion

- PETRI S a d JE SENIUS H Experim tal St d
on the Prod tion of Pern us An mia by
Op atu on the Digest e T act I S rvey i
th R lts f T tal G tre tomy d Resecti
f th Stomach
- LUCIA S P a d AGGEIER P M Th Infl ce of
L e Dam eonth Pl sma Pr th mb
Con centrato and th R pons t Vitamin K
- LENGENHAGER K A Practi l Sol ton f th
P blem f Blood R tor t
- HOLMES B E Serum Chole l a d Irradiation
S ckness

SURGICAL TECHNIQUE

War Surgery

- MITCHNER P H G al Princ pl f T tment
f Ai Ra d Ca ltes
- ZUCKERMAN S HAD ELD G O'REILLY J N
ALSTON J M d Oth rs Th Probl m of
Blast I j ries
- BYWATERS E G L BE LL D B SEY R H R
MILES J A R d Othe Crush I j esw th
Imp rmo t f R l Fu ctu n
- DEBRUNNER H Gu sh t Fact es
- PENFOLD W J TOLHURST J C a d WILSON D
Acti e Imm iz tu Against Gas G ge d
T tanus
- L VNER S Expe c ith G G g n th
F eld From a F ld Hosp tal the West

Operative Surgery and Techniq Postoperativ

- McMICHEL J C lat ry Collapse d W d
Sh k
- LE DE S P tope t Thr mbo Embolism Fe
q cy T m f Occurren and D rat on f the
C rse f th D so d A St tist l l est g
t
- PETTE SSON G Thee C f P l m ry Em
bolism th Operating T bl
- ROB S M th A H T Pulmonary Fat Emb lism
f th l gy Path ges Th rapous Clinical
M t n al Case Hist nes

Antiseptic Surgery Treatment of Wound d In

- A ROG T W d EAM CHER E M The Tre t
m t f Pu rperal Teta s Th R p t f f
Cu ed Case
- CRAWFORD A S a d HOOPES R F The Su gical
A pect f Lightning St ok

- MARBLE H C P rp sef l Spl t g F ll g I
ju est th H d 79
- ALLEN H S Th Tr tm t of Superfi al I juries
and B rns f the H nd 279
- CHILDRE S H M Subfasc l H mat ma a Com
pl c tio of Crush g I j ries to the Foot 280
- V ER H I and BOWE A G Ch cl cal Teta s
T tm ti oo C s cuti Ca esw th a Net
M talty Rat of g P C t 80
- LUCCHESI P F d GIL ERSLEEVE N A thra
KOENIG E S bc t e Phlegm D et D ph
th ia B all 28
- DOMACK G d HEGLE C Ch m therapy of
Ba terial Inf ct ns 28
- MAZZEO M On th Ant Bacte al Effect f the
Sulfamide Prep ti 281
- HURTEAU E F The I trasca l U f S U
mades Exp im tal Study f th Hist logy
nd R te of Absorptio 31
- REED G B and ORR J H Ch m therapy n E
perim tal G Ga ge D strb ti f Drug
f m Infected W u d 28
- GORDON J d McLEOD J W Th R l t V l
of Sulf m d d A tis L pe m t l
G Gangre e 83
- D LEVSKI P S Imm tra f s Acut S pts
cemu 83

Anesthes

- SEEDON C P P l c D li ery u der Local I
f l t t A e thes 51
- ALLE J G a d LIVINGSTONE H P t pe t
Hyp p th mb em d A thes 284
- PHILLIPS F LIVINGSTONE H M d ADAMS W
E A Ch cl cal Co d ratu f A th ia n
I trath a Ope atu 84

PHYSICOCHEMICAL METHODS IN SURGERY

Ro ntgenology

- LOI L Acute Osteomy litis F ll wed p by R t
g E m n pon D ing th Cou s f Con
servati B l gical T eatme t 6
- CLARK K C CORDNER G R M d EL MA P
Expe iments in X R y Sc ih t g phy
ith C t l Direct R tgen g ph 86
- GILLAN R U Th Experim t l Roe tg graphy
f Sm ll Fragme ts f Gl R l t t th 86
- MASTER A M Roe tg sc py Diagnost A d
in C ro ry Oc l A St dy of 64 Cas s 86
- M C LLOU H J A L d SUZHLAND C C
I tra Abd minal C l scat the l t r p ta
t n f Its Roe tg l gical M nif tat 87
- GOLDEN R Ab rmalit: f th Sm H l t u
N tritu l Dist ba c Som Ob rv tu s
The Phys ol gical Basis 287
- ARCHER V W d COOPE G J R I tra Abd m
l H nia I test l l t T
V nified Cases P -Operati ly Diag osed 88
- AXE O Th V l f A th graphy f th Sh ld
J nnt 88

- WIDMANN, B P Radiation Therapy in Cancer of the Skin 290
- KOSKIVEE, L Roentgen-Ray Treatment of Actinomycosis 290
- EBENIUS, B Peroral Roentgen Treatment of Malignant Tumors 290
- SCHENCK, S G The Management of Cancer of the Breast with Pre Operative and Postoperative Irradiation 291
- STRANDQUIST, M Transthoracic Roentgen Treatment of Cancer of the Esophagus 292
- WALTER, R I, BACHMAN, A L, and HARRIS, W The Treatment of Carcinoma of the Ovary Improvement of Results with Postoperative Radiotherapy 292
- HOLMES, B C Serum Cholesterol and Irradiation Sickness 292
- Radium**
- BERVEN, E G E One Hundred and Seventy-Seven Cases of Primary Carcinoma Involving the Vulva 246
- KJELLBERG, S R The Radiological Treatment of Epulis 293
- SCHMITZ, H E, and SREEHAN, J F Five-Year End-Results in Cervical Carcinoma Treated with Radium and 800 Kilovolt Roentgen Rays 293
- MISCELLANEOUS**
- Clinical Entities—General Physiological Conditions**
- BARBER W H The Uses and Abuses of the Sulfonamide Drugs 295
- STRAUSS, E, LOWELL, F C, TAYLOR, F H L, and FINLAND, M Observations on the Absorption, Excretion, and Distribution of Sulfanilamide, Sulfapyridine, Sulfathiazole, and Sulfamethylthiazole 296
- GUARNASCHELLI-RAGGIO, A The Action of Dehydrotachysterin upon Some Electrolytes and upon the β Glycerophosphatase of the Serum in a Case of Idiopathic Tetany 298
- RAMOS, J, and ORIA, J Symptomatology and Histopathology of the Heart in Patients with Megacolon 299
- General Bacterial, Protozoan, and Parasitic Infections**
- PENFOLD, TOLHURST, and WILSON Active Immunization Against Gas Gangrene and Tetanus 273

AUTHORS OF ARTICLES ABSTRACTED

- Adams W E 22 284
 Aggle P M 40
 Allen H S 238 279
 Allen J G 234
 Alton J M 69
 Appel M 4
 Arbogast W 2
 Arch r W 88
 Axé O 288
 Ba hm A L 29
 Bailey H 206
 Baker W H 295
 B l l D 70
 B lsey R H R 27
 Be t l v J 65
 Berven E G E 246
 B ldrey E 06
 E er A G 80
 Brande T 3
 Bywaters E G L 0
 Campbell E W 257
 Campbell M F 5 255
 Childress H M 280
 Cl rk K C 86
 Cooper G J 288
 Cord e G R M 286
 Cornell E L 0
 Cra ford A S 2 8
 D dy W E 6
 D brun H 2 2
 De G ra C F 37
 Dele ski P S 83
 De k W 18
 De y Brow D 14
 D S oo K 3
 D l C F 60
 Dom gk, C 8
 Eb n s B 90
 Ellm P 280
 Emba h L M 252
 Eyh rab d R A 17
 Falcone M A 4
 Fa j t F P
 Ferry J L 60
 Fin k J F 260
 Fin d M 296
 Finoch tt R 263
 F llis R H Jr 16
 F eema S 9
 G bri l W B 240
 Ghitz scu C I 67
 G bbs F W 38
 G ld steev N 80
 Gillan R U 86
 Gold R 37
 Gord J 83
 G dan F S 195
 G o W E 97
 G arnasch ll Ragg A 08
 H dn ld G 69
 H rru W 92
 Hegl C 8
 H nschen C 62
 H lmes B E 92
 Hoop e B F 8
 H d L S 1
 Huat L W 60
 H rt a E F 8
 J ck so C L
 J en H 237
 J es E
 J es J C
 J gh s, H 34
 Juzbaa é D M 34
 Kampm R H 2
 Ka p F
 Ka j n v H 06
 Kelly J D
 K nnard H E 243
 Kilgo R N 7
 Kumbro gh J C 2 5
 Kis m to S 49
 K j lberg S R 93
 K n g E 8
 K l ee L 90
 K rahul k E J
 La C A G 35
 Lah y F H 09
 Lath m O 5
 Laufma H 2
 Lehm J 08
 Lengt hager K 67
 Le e S 73
 Lind S 275
 Landsay J R 08
 La ngsto e H 84
 Livin sto e H M 284
 Lo L 60
 Lp s t J 246
 Low ll F C 96
 Lowsl y O S 5 2 7
 L cch P F 280
 L cia S P 4
 M bl H C 79
 M rtensson K 24
 M n M L 38
 Mast A M 26
 M th e C P 59
 M eo M 28
 M Cullo gh J A L 287
 M I tyr A K 4
 M Kee S H 7
 M Leod J W 83
 McM h l J 4
 McN lly W J 206
 M g J H
 M ch l tt G 7
 M l s J A R
 M tchu P H 69
 M hr H 2
 M d O W F
 M T 34
 N ls H F 09
 N uw lder W 49
 N es B 36
 Onil R F 43
 Oka K 49
 Ordóñez F r yr H 6
 O R lly J N 69
 Oria J 99
 Orr J H 8
 Orsó F 45
 Penf ld W J 73
 Petri S 37
 P tt rso G 275
 Ph llips F 284
 Phillips F J 2
 Qu l F B 38
 Qui la d W S 2 6
 Ram J 00
 Ra-musse H 1
 Reed G B 28
 R h N E 234
 Richa ds R K 40
 R b ki J 67
 R bb-Smith A H T 77
 Roma N 2 7
 Roe T F 210
 Roeba h A F 26
 R ggi n E 44
 R ss ll D S 4
 S hatt kerk J C P 36
 S h ck S G 9
 Schmutz H E 93
 Schneehag H 40
 Sh han J F 293
 Sh ld n C P 5
 Sing J J 20
 So go W 2 6
 Sp H M 5
 Strandq ist M 9
 Stras man E O 45
 Stra E 96
 S th la d C G 87
 Ty lo F H L 96
 Th mpson G C v 64
 Th mp n W B 5
 T ll rst J C 73
 Trag rma L J
 Urib ru J v 263
 Vene H I 280
 Voeg A 49
 W lre R I 0
 W dm nn B P 90
 Wes m n A
 Wilso D 73
 Y nh d T 49
 Zolln R 24
 Z l rm n S 269

CONTENTS—OCTOBER, 1941

PRINCIPLES OF SURGICAL PRACTICE

- Abdominal Traumas—Panel Discussion FREDERIC A. BESLEY, M.D., F.A.C.S., Waukegan, Illinois, Presiding Collaborators JOHN H. MULHOLLAND, M.D., F.A.C.S., New York, New York, FRED W. BAILEY, M.D., F.A.C.S., St. Louis, Missouri, and AMBROSE H. STORCK, M.D., F.A.C.S., New Orleans, Louisiana

299

COLLECTIVE REVIEW

- The "Pressure Theory" of Eclampsia, A Collective Review with Selected Briefs

336

ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

Head

- McKISSOCK, W., and BROWNSCOMBE, B. Apparently Trivial Head Injuries, Preliminary Treatment and Examination, Results and Pathology, Practical Points in Treatment 371
- McINDOE, A. H. Surgical and Dental Treatment of Fractures of the Upper and Lower Jaws in War Time. A Review of 119 Cases 372

Eye

- KIRBY, D. B. Injuries of the Eyes 307
- CAVENESE, H. L., SATTERFIELD, G. H., and DANN, W. J. Correlation of the Results of the Biophotometer Test with the Vitamin A Content of Human Blood 307
- KRAVITZ, D., and MOEHLE, W. Exophthalmos in Hyperthyroidism 307
- VERHOEFF, F. H. Occlusion Hypertropia 308
- Lijó PAVÍA, J. The Eyeground Under Sodium Light Cases of Old Trauma with Loss of Vision in One Eye and Lesions of the Eyeground in the Other 308
- BALLANTYNE, A. J. Ocular Complications in Hyperemesis Gravidarum 342
- STEWART, C. P. Nutritional Factors in Dark Adaptation 394

Ear

- FREY, H., STOKES, A. B., and EWING, I. R. Discussion on the Psychological Aspects of Deafness 308
- LEMPERT, J. Endaural Fenestration of the Horizontal Semicircular Canal for Otosclerosis. Indications, Technique, and Observations as to Early and Late Postoperative Results 308
- BLASHKI, E. P., and CLOWES, A. L. The Operative Treatment of Mastoiditis, A Report on Work Done at the Royal North Shore Hospital of Sydney during the Period from January, 1930 to September, 1940 309

Mouth

- FINOCCHIARO, R. Cystic Parathylioma of the Tongue 309

Pharynx

- MARTIN, H., and SUGARBAKER, E. I. Cancer of the Tonsil 310
- MONTEFANO, A. Pendulous Reticulosarcoma of the Lingual Tonsil 311
- AHLBOM, H. E. The Results of Radiotherapy of Hypopharyngeal Cancer at the Radiumhemmet, Stockholm, from 1930 to 1939 390

Neck

- CATTELL, R. B. The Management of Hyperthyroidism Complicated by Other Conditions 311
- SIEDEK, H. Total Thyroidectomy in Cardiac Patients 312
- YOFFEY, J. M. The Lymphatic Pathway for Absorption from the Nasopharynx, Absorption of Dyes, Absorption of Proteins, Absorption of Viruses and Bacteria 313
- BRIGHTON, G. R., ALTMAN, F., and HAGAN, C., JR. Reactions of Laryngeal Tissues Following Extended Fractional Roentgen Irradiation 314
- LORD, J. W., JR., and ANDRUS, W. DEW. Changes in the Liver Associated with Hyperthyroidism, with a Study of Plasma Prothrombin Levels in the Immediate Postoperative Period 330

SURGERY OF THE NERVOUS SYSTEM

Brain and Its Coverings, Cranial Nerves

- STORCH, T. J. C. von, and KARR, H. H. Reduction of Pain and Other Undesirable Reactions Due to Pneumo-Encephalography 315
- CHILDE, A. C. Calcification of the Choroid Plexus and Its Displacement by Expanding Intracranial Lesions 315

- HERREN R A P pull ma fth Ch n d Pl s 316
 SALFUM W The Otoncurological Diagnosing 3 Ve
 ifed Cases of Tum r of th B 3 6
 LYSBOLM E Roe tgen Pct e M m fthe
 T torium 3 7
 GANT F C a d WEINB GE L M Experien es
 wth I tramedullary Tract t my R I f of F
 cal Pain d S mmmary of Operat Results 3 8

Miscellaneous

- RUSSELL, H Observ u th Classifi ti of
 the Gl m 3
 COLEMAN C C War W d f the Nerv s Sys
 t m 373
 BREIER R N BAKER A B BEATON J G SHAFER
 J M a d Others Nerv I j ry P oduced by
 Sulf nylamide d Some of Its D n at es th
 Chicken 309

SURGERY OF THE THORAX

Chest Wall and Breast

- PARSONS W H a d McCALL E F The Rôl f
 Estrog n S b ta ces the P od tion f M
 l gn t M mmmary Les o 32

Trachea, Lungs, and Pleura

- FARBBEROV B E a d BASLOW E A Prim ry Tu
 m rs f th Lungs Ro tgen D gn os d
 Therapy 3
 GEBAUER P W The Diff nt t of B cho-
 g c Carcin mas 3
 WEINB c L I P ripl tis 3
 OSBOR G R P l m n y Co c on (Bla t) 375

Heart and Pericardium

- SIEDEK H Total Thyrd tomy Ca d I t t 3 2

Esophagus and Mediastinum

- OCHS ER A d DeBAKE M S g cal Aspects f
 C rcinom f the Esophagu Revew f th Lt
 e tu d R port of 4 C es 3 3

SURGERY OF THE ABDOMEN

- Abd m l Traumas—P l Discuss FR RIC
 A B SLEY MD FACS W k ga Ill is
 P esid g Coll borat rs J HN H M LN
 L T MD FACS New Y k n w Y k
 F ED W BAILEY MD FACS St Lo is M
 so n d AM ROSE H Sto ck MD FACS
 n w O l Lo ana 299

Abdominal Wall and Peritoneum

- O'LEARY C M d C YMER C E Umbil H rma 3 4

Gastro-Intestinal Tract

- LOE L Ch ges in G stry Ac d ty C ed by Ch l
 cyst ga trost my and Ch leyst l ode osto-
 my f Calculus f th Bile Tract 3 4

- SOVENA E A Clin c l Co tr but on t th t j f
 Phlegmo o s G stritis 324
 REID M R Th U f Clinical Mat ialf th I
 estigat of Ga tric Ca c r 32
 COLLINS S D GOVER M a d D H F Th
 Tr d d Geographic Va iation: Ca c Mo
 tality d l al nce wth Spec l Refe en t
 G tr C 3 6

- GRISWOLD R A a d A TO CIC R F P f rated
 Pept c Ul e 326
 SEGELMA S l Simpl Ule rs of th Sm l l i t st e 3 7
 HO SLEY J S R t of the D odenum f T
 m of the Ampulla f v t 3 7
 HUNT E L a d KANE G D P m ry Ad oc
 cin m f the J m 328
 BLACK C E Appe du u 328
 HILLMAN R W O ya na f the Appe d A Clin
 ic l St dy of 3 C 3 8
 YUNICH A M and C ORN B B Atyp c l R gon l
 Ile tis Roentge l gical Limitati 389
 CHUVV C F and HARKINS H N E pe m t l
 St dies Alum t ry Azotem Th Rôl f
 Blood Absorpt f m the G t o l t t l
 Tr ct 395

Liver, Gall Bladder, Pancreas and Spleen

- MURAKAM T a d UC IVAMA H F tons of th
 E trahept Bil D t d S t j F ct
 f the L Clin l St dy o th Rel t B
 tw en th D od l M me t a d the E cu
 ton f B l int th D ode m D Fastng
 Experim tal St dy of the R latu B tw th
 Mo em ts of th Duodenum and th Fu ct
 f the Biliary T t D ing l astng 3 9
 KILSEMANV E Clin on Biliary T t Atres 3 9
 LORD J W J d A DEUS W DEW Ch g s
 th L r a ocia t d wth Hyperthyrd m w th
 Study f Plasma Prothromb L l th
 Immed: t Post p at e P od 330
 DO BRING P C M cr sc p ally n P th l g c l
 Gall Bladder Clin c path l gical St dy 33
 F R ACOLA C d TACO T E R e tg l g al
 D gn os f a Spo ta Fistula B tw the
 G l l Bladd d D od m C sed b Bili y
 C lcul 330
 SJÖGREN, S F D t c l m L k F r m t the
 Ch l doch Dem trat d by Ch l g phy 33
 F A CO S C C m f the H d f th l
 cr as A R ew of 4 Ca es 33
 D ILLA M C RE B Th P r m ent Good Eff t
 f L g u f th Splen A t ry Asc ti
 Sple ohepat Synd m 332
 G BLER O H d G LBRAITH H W Effect f
 P reparat f m th A ter f t t r v Lobe
 in Lape m ntal D b tes 400

Miscellaneous

- BERK J E ROTH CHILD N S d D t J C
 l t Abd m l Apopl xy 332

GYNECOLOGY

Uterus

- BODELMANN, W. Uterus Solidus 334
- KNAPP, M. Effect of Follicular Hormone Upon the Function of the Human Myometrium 334
- STONE, R. S. and ROBINSON, J. M. Roentgen Irradiation of the Pelvis in Carcinoma of the Cervix Uteri 390
- HYMAN, J., RUTENFELD, O., and BENNER, S. The Radiumhemmet Experience with Radiotherapy in Cancer of the Corpus of the Uterus 392

Adnexal and Peruterine Conditions

- MACLEH, W. I. Benign Tumors of the Ovary Associated with Ascites and Pleural Effusion 334
- PIATZ, J. Six Additional Cases of Primary Carcinoma of the Tubes 335
- VICENS, H. Ovarian Rhythm During Pregnancy 342

External Genitalia

- COHN, A., STEFF, A., and ADLER, L. L. Further Observations on Gonococcal Vulvovaginitis 335

Miscellaneous

- WITTEBACH, P. The Use of Heparin as a Prophylactic Against Thrombosis Following Gynecological Operations 366

OBSTETRICS

- JOSEPH A. DAVIS, B. M. and LEO SNOOK, M. D., Chicago, Illinois. The "Pressure Theory" of Pclampsia, A Collective Review with Selected Briefs 336

Pregnancy and Its Complications

- VICENS, H. Ovarian Rhythm During Pregnancy 342
- BALANTINE, A. J. Ocular Complications in Hyperemesis Gravidarum 342
- WILSON, J. S. G. An Evaluation of the Treatment of Albuminuria of Pregnancy by the Water Balance Method Assuming the Theory of Water Intoxication in Pregnancy 342
- OPENO DIAZ DEL CASTILLO, I. Investigations on the Kidney of Pregnancy 343
- FRAMMICH, E. Shotgun Wound of the Pregnant Uterus 344

Labor and Its Complications

- DURR, F. The Modern Therapy of Labor in the Presence of Contracted Pelvis 344
- IRISSNER, H. The Use of Heparin in Obstetrical Practice as a Means of Preventing Thrombosis
- CLASON, S. Three Cases of Pulmonary Embolism Following Confinement Treated with Heparin 366

Newborn

- HENDERSON, H., LITTLE, F. B. and FROST, I. S. The Relative Effect of Analgesia and Anesthesia in the Production of Asphyxia Neonatorum 344

- HUBER, C. P., and SHRADEF, J. C. Blood Prothrombin Levels in the Newborn 345

GENITO-URINARY SURGERY

Adrenal, Kidney, and Ureter

- KATZ, F., and MANZFR, F. Successful Grafting of the Adrenal Gland in a Case of Addison's Disease 346
- BFGMAN, R. T. Vaginal Ureterolithotomy 346
- NOWELL, S. Increasing Density of the Renal Shadow During Excretion Urography, A Sign of Acute Ureteric Obstruction 387
- CLARK, W. G. Vitamin B Complex and Adrenalectomy 394
- SWINGLE, W. W., REMINGTON, J. W., HAYS, H. W., and COLLINGS, W. D. The Effectiveness of Priming Doses of Desoxycorticosterone Acetate in Protecting the Adrenalectomized Dog Against Water Intoxication 400

Bladder, Urethra, and Penis

- WHEELER, W. K. Periostitis Pubes Following Suprapubic Cystostomy 346
- PARMENTER, F. J. Diverticulum of the Female Urethra 346

Genital Organs

- TRABUCCO, A. New Ideas in Regard to the Pathogenesis of Adenoma of the Prostate 347
- DORMAN, H. N. Transurethral Prostatic Resection 347
- GUTIERREZ, R. Perineal Prostatotomy and Prostatectomy for the Removal of Prostatic Calculi 347
- MAIER, R. Prophylactic and Curative Treatment of Metastases of Malignant Tumors of the Testicle 349

Miscellaneous

- RAFOVICH, S. Urogenital Tuberculosis 349
- CIFUENTES DE LA TE, L. The Male Sex Hormones 350

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

Conditions of the Bones, Joints, Muscles, Tendons, Etc

- Sciatic Pain in Low Back Derangements, Its Incidence, Significance, and Treatment. A Symposium. CHANDLER, I. A. Introduction. WILLIS, T. A. Anatomical Variations and Roentgenographic Appearance of the Low Back in Relation to Sciatic Pain. CRAIG, W. McK., and WALSH, M. N. Neuro-Anatomical and Physiological Aspects and Significance of Sciatica. KLEIN, J. G. Conservative Treatment of Sciatic Pain in Low Back Disability. BAER, J. S., and MINTZ, W. J. Posterior Protrusion of the Lumbar Intervertebral Discs. FARFEL, B. P., and MACCRACKEN, W. B. Spine Fusion for Protruding Intervertebral Discs. MEYERSON, H. W. Low Backache and Sciatic Pain Associated with Spondylolithesis and Protruded Intervertebral Disc. Incidence, Significance, and Treatment. OHL, F. R. Fasciotomy for Sciatic Pain. HAYMAN, C. H. The Relief of Low Back Pain and Sciatica by Release

- f* Fasc and Muscl FREIB A H The
fascial El m t i A sociated Low Back d
Sc t P n BADG LY C E The A tcul r
F cets i Relat nt Low B ck P n a d Sc t c
R d t
- 352 STAU ER, H M ARBUCALE R K a i AEGERT
E E P lyostot c F b s Dysplas a w th C
t eous Pigme t t d C g nital Art
en u d urysm
- 360 AXELRAD L D Ch ges in the Spine F ll i g
T t n s
- 360 OGILVE W H W ds f th knee Jo t w ds
See W th Six Ho rs Wo d Seen Lat
Seps Closed Pl ter
- 375 KEY J A The Ea ly Op r t T tm t f i ute
Hem tog no Osteomyel t s
- 384 WILSON J C The D layed Ope t e T tm t f
i He t gen O tomy t t
- 385 MASS RINI A Roentg Aspects f G t C ll Tu
m rs f the B es T ted w th R tg Irra
d t
- 387 HA C J A th gr ph Stud s th A k le
J t
- 388 DE VRA JO A d O no a C R tg Th i y
i Sc p l h m i Per a th t
- 389
- Surgery of the Bones Joints, Muscles, Tendons Etc**
- GRAS O R Spo t E ol to f A t Hem
t ge ou Osteomyel t d lts Expectant Teat
ment M ual d d lay d f t r v t
- 360 W SSERSC J D T e t m t f t be c los of the
Sh uld A Study f End Res ft
- 36 VAN N S C I The T atm to f N u bl Sh t
en g f O of the Low r L mb
- 36 KOO TZ A R a d SHACKELFORD R T Comp ra
t e Res lt i th Use of LIVING d P sc d
F sc as St t M t r i l B n
- Fractures and Dislocations**
- 36 GR VILLIUS A So-C lled I ff e cy Fract es
F ct
- 363 POLLOCK C A d CHORMLEY R K Ea ly R p
of B e An E pe me t l Study of C rta
- 363 U I T M R a d McL A F C Cal t e t a d
O sificati Co t i f C l h t i th Frac
t e C l l s kach t c Rats
- 363 HOGAN LETZ O A TH T atm nt f fra c es
w th St m lat g D ses f A t R tcul Cyt
t r s rum
- 364 ROTH H C g D lyed q l e t l l ng
Traum tic L tuo f the H p j int
- 364 AGOSTINE LI F V t al T act n r T t t th
Zen th n Fra t es f th F m Child n
- 365
- Orthopedics in Ger i**
- 38 CORRA DOS SA TOS H Som R ma ks in F f
Ric ds Ope t S g i l Cond t C h
ng f the Foot
- SURGERY OF BLOOD AND LYMPH SYSTEMS**
- Blood Ve sels**
- 37 SF U FF H M ARBUCALE R K a i A RTER
F E P lyost t c F brou Dysplasia th C a
- neous Pigme t t n a d Co g tal Art e
n s An urysm 360
- BIG ER I A P ph l Vasc la l ju 376
- 352 FRAY W W Roentg M festat f i t i
sclerosis f the B anches of th Abd m al i t
with Pat cul R f n t C l f i t f
- 388 B h s f th C l A
- 360 JORFF F Pu Hep f th P ent d
T tment of Thrombosis CRAFOO C H
p s P phyl t c Ag n t Post pe t
Th mbos WETT RD L P Th U of H
p in s a P phyl t c Ag st Thrombo l l
g Gyneec l g i Ope t L ss e H
The U e f H pa n Un Ob t t cal P tice s a
M of P e t g Th mb s CLASO S
Th Cases f Pulm ry Embol m F ll i g
Co fi n t T d th H p BAUF
G F l Diagnos f A Th mbos by
Mea of A ography a d Ab o t t t me t
w th H p LINDG E S d WILA DER O
Th L se f H t n n l sc l S g y ROSEN
QUIST H Th Use f l of H p C m
b t g A t r i l Embol sm a d Thrombot Com
plic t LYND S On the I cid c of
Th mbo Embol sm Foll i g S g cal Ope a
t d lts f g nce n th Le g th of th Re
mbe t P d HEDE RS P Th U f lfe
p n i t m l D e ase 366
- 367 ZOFF G d F LH RD O Th Co d t F
abl f Air Embol m fte Open g f th Ve a
Ca a l f
- Blood Transfusion**
- 36 H BFR C P a d STRAD R J C Blood P th m
b n Le l the New born 34
- 36 TAY O N B d WATF S E T I ng l
Tra f Fl d n Hemorrhag 383
- 362 CLEMR S J Th Practic f Blood T ansf
WHITBY L F H VALGHA J d BROWN H Dis
u the Th ape t c v l f Tra sf
f D r t t e s of Blood 368
- 363 HOX O TH P d S C Imp m t i
Bl od T f S r e Et bl t m nt d
Operat f Blood Tra f S r vce R
sults f 3077 T nsf f B k Blood A
St t t c l A lvs 369
- 363 JEWES RY F C O R act afte the T
f f St ed Blood 37
- SURGICAL TECHNIQUE**
- War Srgery**
- 364 Co A Z Lo d nd A B mba dm t Som
M d al A pecta 37
- 364 M KIS OCK W d B o s m B Appa thy
Tr al H d l ju es P l m ry T m t
d E munt Res lt d P th l gy Pac
t call s T m t 37
- 364 Mcl po A H S g al d D ntal T m t f
F actu es f th Uppe a d Lo J W
Time AR ew f g Cases 37
- 364 COL MC C C W W d f th N rv u by tem 371
- 364 OSB R G R Pulm ry C su (Bl t) 375
- 364 OHLTF W H W d f th K j nt Wo d
See W th S H rs Wu d See Lat
Seps Closed Plast 375

- BICGER, I. A. Peripheral Vascular Injuries 376
- BLALOCK, A., and MASON, M. F. Blood and Blood Substitutes in the Treatment and Prevention of Shock, With Particular Reference to Their Uses in Warfare 377
- ROSS, J. A., and HULBERT, K. I. Treatment of 100 War Wounds and Burns 377
- COLEBROOK, L., LEWIS, L. E., MOWLEM, R., and LEVING, A., and Others. Discussion on Chemotherapy and Wound Infection 378
- Chemotherapy for Infectious Diseases and Other Infections, Circular Letter No. 81 379
- AMIES, C. R. The Stability of Tetanus Antitoxin under Suboptimal Storage Conditions 379
- NICOLL, F. A. Rehabilitation of the Injured 380
- DELOVIMIER, A. A. Wartime Military Roentgenology 380
- Operative Surgery and Technique, Postoperative Treatment**
- DEBENHAM, M. The Primary Repair of Tendons 381
- COTTA DOS SANTOS, H. Some Remarks in Favor of Ricard's Operation. Surgical Conduct in Crushing of the Foot 381
- MAFS, U., and DAVIS, H. A. Fluid Replacement in Surgical States with Particular Reference to Transfusion of the Ascitic Fluid, A Clinical and Experimental Study 382
- TAYLOR, N. B., and WATERS, E. F. Isinglass as a Transfusion Fluid in Hemorrhage 383
- ROWLANDS, R. A., and WALKLEY, C. P. G. Fat Embolism, 2 Fatal Cases, A Case with Recovery, Etiology, Mechanism, Post-Mortem Appearance, Symptoms and Physical Signs, Differential Diagnosis, Treatment 383
- Antiseptic Surgery, Treatment of Wounds and Infections**
- AXELRAD, I. D. Changes in the Spine Following Tetanus 360
- KEY, J. A. The Early Operative Treatment of Acute Hematogenous Osteomyelitis 384
- WILSON, J. C. The Delayed Operative Treatment of Acute Hematogenous Osteomyelitis 385
- HOOKER, D. H., and LAM, C. R. Absorption of Sulfanilamide from Burned Surfaces 385
- Anesthesia**
- HENDERSON, H., FOSTER, E. B., and LEO, L. S. The Relative Effect of Analgesia and Anesthesia in the Production of Asphyxia Neonatorum 344
- PERFIMAN, I. M., and BENSTEIN, V. S. The Use of Sovcaine for Local and Spinal Anesthesia 386
- LEMMON, W. T., and PASCHAY, G. W., JR. Continuous Spinal Anesthesia 386
- PHYSICOCHEMICAL METHODS IN SURGERY**
- Roentgenology**
- BRIGHTON, G. R., ALTMANN, F., and HAGAN, C., JR. Reactions of Laryngeal Tissues Following Extended Fractional Roentgen Irradiation 314
- STORCH, T. J. C. von, and KARR, H. H. Reduction of Pain and Other Undesirable Reactions Due to Pneumoencephalography 315
- CHILDF, A. F. Calcification of the Chorioid Plexus and Its Displacement by Expanding Intracranial Lesions 315
- LASHOLM, L. Roentgen Picture in Meningioma of the Tentorium 317
- FARBROW, B. E., and BASLOW, F. A. Primary Tumors of the Lungs. Roentgen Diagnosis and Therapy 321
- FERNICOLA, C., and FERNICOLA, E. Roentgenological Diagnosis of a Spontaneous Fistula Between the Gall Bladder and Duodenum, Caused by Biliary Calculus 330
- SJOGAARD, S. F. Diverticulum Like Formation in the Choledochus Demonstrated by Cholangiography 331
- DELOVIMIER, A. A. Wartime Military Roentgenology 380
- NOBLE, S. Increasing Density of the Renal Shadow During Excretion Urography, A Sign of Acute Ureteric Obstruction 387
- MASSERINI, A. Roentgen Aspects of Giant Cell Tumors of the Bones Treated with Roentgen Irradiation 387
- HANSSON, C. J. Arthrographic Studies on the Ankle Joint 388
- IRAY, W. W. Roentgen Manifestations of Arteriosclerosis of the Branches of the Abdominal Aorta, with Particular Reference to Calcification of Branches of the Celiac Axis 388
- YUNICH, A. M., and CHONIN, B. B. Atypical Regional Ileitis, Roentgenological Limitations 389
- DE ARALJO, A., and OSBORNE, C. Roentgen Therapy in Scapulohumeral Periarthritis 380
- WARREN, S. The Radiosensitivity of Tumors 389
- AHLBOM, H. E. The Results of Radiotherapy of Hypopharyngeal Cancer at the Radiumhemmet, Stockholm, from 1930 to 1939 390
- STONE, R. S., and ROBINSON, J. M. Roentgen Irradiation of the Pelvis in Carcinoma of the Cervix Uteri 390
- Radium**
- KAPLAN, I. I. Radium Beam Therapy 391
- HEYMANN, J., REUTHER, A. O., and BENNER, S. The Radiumhemmet Experience with Radiotherapy in Cancer of the Corpus of the Uterus 302
- FRIKSON, S. Nævus Epithelioma Cylindromatosus, with Special Reference to Its Radiological Treatment 397
- MISCELLANEOUS**
- Clinical Entities—General Physiological Conditions**
- STEWART, C. P. Nutritional Factors in Dark Adaptation 394
- ANDERSON, E. R., KARABIN, J. E., UDESKA, H. L., and SFFED, L. The Oral Administration of Synthetic Vitamin K (2-Methyl-1, 4-Naphthoquinone) 394
- CLARK, W. G. Vitamin B Complex and Adrenalec-tomy 394

- SYDENSTRICKER V P Th Cholelithiasis
f N utric Acid d Raboia in D fici cy
(P ilagra) 394
- CHUNN C F and HARKINS H N L pe m tal
Stud es Alim tary Az temia Th R l of
Blood Ab rption fom th G str I t ti al
T act 395
- CALVIN D B Pl sm Vol me d Pl sm P t n
C cent tion Aft r S e e H morrh ge 395
- NEUWELT F LEVINSON S O d NECHLES H
St d Shock Variability f the Sh ck Syn
drom in To c Drug Shock 395
- QUILL L M a d MARTIN E C Epulosa 396
- NANNING M C Late Res lts of V l om 396
- TESORIÈRE A A Tumo with G l s Cell in a
G l Twel l ars of Ag 397
- ERIKSON S Næ us Ep th l m Cyb d m t s
w th Spec l R ferenc t lts R d l gical Treat
m t 397
- BLUM H F Sunlight d C of th Sk 397
- PUND E R a d STELLING F H Lymph s ma
Report of 3 Apparently Cu ed C es 398
- ALLEN F M Red c d T m p r t in S g y
(Su g y of th Lumba) 398
- General Bacterial Proto oan and Parasitic Infections**
- GOLD FRG S L d BLOOM T HAL E D Staphy
lococ S pt c m 399
- MARSHALL F A Jr B ATTO A C EDWARDS
L B a d WALKER E S lfa lygu nidan
th T d t m t of Acute B c l l ry Dysentery in
Chldre 399
- PETERSON O L STRAUSS E TAYLOR F H L d
FINLAND M Absorpti E c t d D tri
buti n f Sulfadiaz (S U l modypyrim
d) 399
- BIETER R N B KE A B BEATO J G SHAFFER
J M a d Oth rs N r v s l j ry P od ed by
S lfanilamid d come f lts D t u th
Ch l n 399
- Ductless Glands**
- G BLER O H d GALBRATH H W Effects f
P p ations f m th V t r n P t tary Lobe in
E p mental P cr tic D betes 400
- SWINGLE W W REMINGTON J W HAYS H W
and COLLING W D Th Eff ct e es of Prun
ing D es of Desoxyr c t coste Ac t te
Pr t ct g the Adr alectomized D g Again t
W t l to ic ti 400
- BISCHO F LO G M L RUFF J J a d CLARKE
G J E doctrine F tors l f e cing Tum D
el pm t 40
- KUP J C nc ning th Mech m of th A t
G d t p c l p hyse l F t 40

CONTENTS—NOVEMBER, 1941

PRINCIPLES OF SURGICAL PRACTICE

- Surgical Bacteriology—Panel Discussion FRANK L. MEYER, M.D., F.A.C.S., New York, New York, Presiding Collaborators EDMUND ANDREWS, M.D., F.A.C.S., Los Angeles, California, J. DERYL HART, M.D., F.A.C.S., Durham, North Carolina, and WILLIAM A. AITENMEIER, M.D., F.A.C.S., Cincinnati, Ohio 403

COLLECTIVE REVIEW

- The Present Status of Peritoneoscopy ARNOLD STARR, M.D., F.A.C.S., and HOWARD FRANK, M.D., Boston, Massachusetts 423

ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

Head

- MILIANI, R. Hemisection of the Mandible on Account of a Large Adamantinoma 411
HAUTENSTEFN, K. Gunshot Wounds of Jaws, Their Treatment and Prognosis 480

Eye

- GIFFORD, S. R. Results of Surgical Treatment of Paralysis of the Superior Oblique and Superior Rectus Muscles 411
REA, R. L. The Treatment of Thrombosis in the Central Vein of the Retina with Heparin 411
DOHRFETZ, W. B. Orbital Implants, with Special Reference to Vitallium 412
REA, R. I. The Repair of Lacerated Eyes 478

Mouth

- BROWN, J. B., and McDOWELL, F. Secondary Repair of Cleft Lips and Their Nasal Deformities 412
BECK, H. Fractures of the Temporomandibular Joint and Associated Fractures 414
JACOBS, M. H. Malignancies of the Oral Cavity 414
THOMAS, K. H. Rhabdomyoma of the Tongue 415
IYI, R. H., and STOUT, R. A. Emergency Treatment of War Injuries of the Face and Jaws 479

Pharynx

- WILLIAMS, A. C., and MARCUS, P. S. The Choice of Anesthesia in Ludwig's Angina 492

Neck

- KARTAVIN, V. A. Malignant Tumors of the Thyroid Gland 415
CHAIKOFF, I. L., ENFENMAN, C., CHANGUS, G. W., and REICHERT, F. L. The Influence of Thyroidectomy on Blood Lipids of the Dog 415

SURGERY OF THE NERVOUS SYSTEM

Brain and Its Coverings, Cranial Nerves

- GUINÉE, N. Should the Fresh Bullet Wound of the Brain Be Sutured? 417
WOODHART, B., and BAKER, T. W. Pneumatocoele Occipitalis 419
SCHULTZ, W., and BRIZENDANT, W. The Treatment of Infected Shotgun Wounds of the Skull and Brain in the Military Hospital 480

SURGERY OF THE THORAX

Chest Wall and Breast

- TEAHAN, R. W. The Treatment of Carcinoma of the Breast by Interstitial Irradiation 495
HEFMAN, J. The Effect of Androgens and Estrogens on Spontaneous Benign Mammary Tumors in the Rat 501

Trachea, Lungs, and Pleura

- BRUNN, H., SHIPMAN, S., GOLDMAN, A., and ACKERMAN, L. Tuberculous Cavitation and Transpleural Decompression 420
WOLF, J. F. The Possibilities and Prognoses of the Suction Drainage of Cavities of Monaldi 420
VASCHTSCHINSKY, N. A. Suppurative Pulmonary Processes 421
ORMEROD, F. C. Some Notes on the Treatment of Carcinoma of the Bronchus 421
D'AGOSTINO, M., and PARRA, M. An Experimental Study of the Production of Pleural Adhesions 421
CALDWELL, E. The Treatment of Thoracopulmonary Wounds 481
WESTERMARK, N. A Roentgenological Investigation of Traumatic Lung Changes from Blunt Violence to the Thorax 494
VACCAREZZA, R. F., and GÓMEZ, J. B. Pulmonary Pictures in the Extrathoracic Forms of Tuberculosis 504

- WETTERDAL, P. The Use of Heparin in the Prevention of Thrombosis after Gynecological Operations 447

OBSTETRICS

Pregnancy and Its Complications

- TORRIN, R., and HART, B. F. Placenta Bilobata 448
 KIRCHNER, O. Results in the Treatment of Placenta Previa at the City Gynecological Clinic in Essen in the Years from 1923 to 1937 449
 BENEDEK, A. The Fate of the Fetus after Threatened Abortion 448

Labor and Its Complications

- PATTON, G. D., and MESSY, R. D. The Value of Calcium in Labor and in Uterine Inertia 448
 BRER, A. C., TAYLOR, I. S., and COLEMAN, R. F. Vitamin K Administered to the Mother During Labor as a Prophylaxis Against Hemorrhage in the Newborn Infant 450

Puerperium and Its Complications

- HERNIMSS, K. The Use of a Sulfonamide Preparation in the Puerperium 451
 GOODALL, J. R. Gynecological and Puerperal Thrombophlebitis Contrasted with Phlegmasia Alba Dolens 451

Newborn

- LEED, C. J. The Prevention of Asphyxia Neonatorum 451

Miscellaneous

- OLSEN, A. Nursing under Conditions of Thirst or Excessive Ingestion of Fluids 452

GENITO-URINARY SURGERY

Adrenal, Kidney, and Ureter

- SCHROEDER, C. H. Cystic Hemorrhagic Tumors of the Adrenal Gland 453
 FOWLER, H. A. Bilateral Renal Ectopia. A Report of 4 Additional Cases 453
 BONANOME, I. Four Clinical Cases of Papillary Tumors of the Kidney Pelvis 454
 DE CARLO, J. Postcaval Ureter 454
 HYMAN, A., and LEITER, H. E. Surgery of the Inferior Vena Cava in Urological Conditions 455
 ASCOLI, R. The Immediate Postoperative Treatment, and the Fight Against Recurrence in Operations for Urinary Stone 456

Bladder, Urethra, and Penis

- MICHAJLOWSKY, B., SCHERSCHLVER, D., and RECHTNE, M. Secondary Lesions of the Urinary Bladder in Cancer of the Genital Tract in Women 446
 WARRICK, W. D. Cystitis Cystica, Bacteriological Studies in a Series of 28 Cases 457

Genital Organs

- CRIPPY, C. D. Resection of the "Large" Prostate, Technique and Results 457
 BRUNT, P. One Hundred Cases of Transvesical Prostatectomy 458
 LUSCHKE, A. Concerning 99 Cases of Cryptorchidism and Their Treatment in the Surgical Division of the Zurich Children's Hospital in the Period from 1928 to 1937 459
 OSMOND, J. K., and PIERCE, C. L. Malignant Tumors of the Testicle 460

Miscellaneous

- WHITE, J. C., and HILL, J. H. Bacterial Uracae Critique of Methods Heretofore Used for Demonstrating Bacterial Uracae and Presentation of Valid and More Sensitive Test Study of Ureolytic Action of Bacteria of Significance in Genito-Urinary Infection 461

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

Conditions of the Bones, Joints, Muscles, Tendons, Etc

- GRUNING, P. The Distribution of Lesions of Muscles, Bones, and Joints Through Work with Compressed Air Machines, with Special Reference to Their Localization 462
 MASCHIONI, H. A., and RUSSEL, C. Fluorine Osteosis 462
 KORTZ, P. G. The Role of Orthopedic Measures in the Treatment of Articular Tuberculosis 463
 COLOMBANI, S. The Frequency of Complications of the Urinary System in Patients with Osteo Articular Tuberculosis 463
 BELFANO, A. Experimental Research on the Osteogenesis by the Vesical Mucosa in the Repair of Bones 464
 LIBERTI, A. Segmental Bone Regeneration with Heteroplastic Grafts 464
 JACOBSON, S. A. Critique on the Interrelationships of the Osteogenic Tumors 465
 BOSSORTH, B. M. Calcium Deposits in the Shoulder and Subacromial Bursitis. A Survey of 12,122 Shoulders 465
 HOLMBERG, L. Septic Spondylitis Seven Cases. 466
 DELITALA, F. Function in Ankylosis of the Hip Joint 466
 GUI, L. Anatomical Study in a Case of Pseudarthrosis of the Femoral Neck Cured by Inter-trochanteric Osteotomy 466
 DEFINI LICH, L. Bipartite Os Naviculare Pedis 467
 JIMENO-VIAL, I. Gunshot Wounds of the Shoulder Joint 468
 CORTSE, G. Clinical and Experimental Contribution to the Study of Bursitis with Special Attention to the Etiopathogenetic Problem 469

Surgery of the Bones, Joints, Muscles, Tendons, Etc

- FARILL, J. Arthrodesis in Tuberculous Coxitis 467
 HORFISSECK, L. Results of Curved Resection After the Method of Helfrich for Tuberculosis of the Knee Joint of the Adult 467

Fractures and Dislocations

- AHLBERG A. The Treatment of Humerus Dislocations of the Shoulder Joint 468
- BADER L. A Clinical Statistical Study of Fracture of the Clavicle 468
- HEIM H. Why a Dislocation of the Shoulder is a False Joint of the Carpals? 469
- CAGLIATI T. Increasing Frequency of Fractures of the Spine in Processes in Shoe Workers (So Called Shoe Workers Disease) 469
- CARRELL B. and CARRELL W. B. Fractures in the Neck of the Femur in Children with Patella Refractures 469
- LOGROSCINO D. Fractures of the Tibial Spine in Skiers 470
- JIMENO-VIDAL F. G. Humerus Fracture of the Clavicle 486
- MOORE P. L. and BRACHER A. N. M. H. Fracture of the Repetitive Cases 486
- CALDWELL G. A. New Developments in Treatment of Compound Fractures 487
- JIMENO-VIDAL F. Isolation Hospital for Gunshot Fractures 488

Orthopedics in General

- GALLIE W. E. The Experiences of the Canadian Army and Air Force with Amputations of the Lower Limbs 4

SURGERY OF BLOOD AND LYMPH SYSTEMS

Blood Vessels

- WETTERDAL P. The Use of Hippin in the Prevention of Thrombosis in Gynecological Operations 447
- GOODALL J. R. Gynecological and Puerperal Thrombophlebitis Contrasted with Phlegmon Alba Dol 4
- SALAD C. A. Occlusion of the Periphlebitis Clinical Analysis of Treatment 472
- DESGARDES C. Thrombosis of the Phlebites of the Lower Extremities with Pathological Notes on the Cause of the Lumbosympathetic Ganglion-Lenche 47
- ROSSI C. Consideration of Embolism of the Arteries of the Limbs of the Impotence of the Arteries 472
- SCHAEFER H. A. Electromyography of the Obliterated Limbs of the World War II 473
- WILLIAMS H. H. the World War II 473
- CEDER F. of the Necessity of the Suturing of Blood Vessels? 477
- CRAMER C. D. L. peritonitis of the Thrombosis 55

Blood Transfusion

- PETRI S. NORCA D. F. d. J. SPINICIS H. E. peritonitis of the Stomach the Production of Peritonitis by Operation on the Digestive Tract Result of 3 Types of Combined Electrosensory Stimulation of the Digestive Tract 44
- DENSTEDT O. F. O. S. O. R. D. F. R. O. C. I. F. M. N. d. S. T. A. S. H. I. L. I. b. l. m. th. l. r. serv. t. Blood 473

- CROSBIE A. and SCARBOUGH H. St. des Stored Blood Changes in the Erythrocytes during Storage 473
- EERLAND L. D. d. BEHRE D. M. Th. Transfusion of Preserved Blood Plasma 474
- ROSE B. WEIL, P. G. d. BROWNE J. S. L. On the Use of Concentrated Plasma Serum and Pooled Lymphocyte Serum in the Treatment of Shock 475

SURGICAL TECHNIQUE

- Surgical Technique—P. I. Disc. so. FRANK L. MELENYEN M. D. FACS N. W. York Perid. Collaborators EDMUND A. DREW M. D. FACS Los Angeles Calif. J. D. VL. HART M. D. FACS D. ham North Carolina d. WILLIAM A. ALTEMEIER M. D. FACS C. in t. Ohio 403
- War Surgery
- GULEKE, N. Shod the Feet of the World of the Brain Surgery 417
- GALLIE W. E. The Experience of the Canadian Army and Air Force with Amputations of the Lower Extremities 47
- JORDAN E. P. a. d. HALP RIV G. T. tarsus To of the Phylaxis 476
- ROADS J. E. W. W. A. a. d. LEE W. E. Th. Use of Adhesions in the Treatment of the Trunk Shock of the Brains 476
- KIRSCHNER M. Th. Treatment of Gunshot Wounds 476
- MATTHEW D. N. Th. Surgery of the Pelvic Case 477
- WENZEL H. H. the World War II 477
- RE R. L. Th. Repair of the Lateral Eyes 478
- IVY R. H. d. STOUT R. A. Emergecy Treatment of War Injuries of the Face and Jaws 479
- HAUENSTEIN K. G. h. t. Wo. d. f. Jaws Th. Treatment of the Prognosis 480
- SCHULZE W. d. BELZE H. W. Th. Treatment of Infected Shingles of the Skull 48
- CALDARERA F. Th. Treatment of Thoracic Injuries 481
- TURER G. C. hot W. d. f. th. He. t. 48
- STORC A. H. Abdominal Injuries 482
- JIMENO-VIDAL F. G. sh. t. W. d. f. th. Sho. ld. J. t. 483
- JIMENO-VIDAL F. G. h. t. F. ct. e. f. the Cl. cl. Moo. P. L. a. d. BRACHER A. N. M. ch. F. ac. t. R. pot. f. g. Case 486
- CALDWELL G. A. N. W. D. l. p. m. e. t. in. th. Tre. t. m. nt. f. Compo. d. F. ct. es 487
- BALDRADE M. LLO N. Th. The Pot of the Pot of the W. ded. by. u. 487
- EERNS M. Th. P. p. t. i. f. th. W. ded. f. r. Tra. port. from. Aid. Stat. ns. Close. th. Com. bat. Zo. 489
- JIMENO-VIDAL F. Isol. t. Hosp. t. l. f. r. G. h. t. Fract. es 488

Operative Surgery and Technique, Postoperative Treatment

- BLALOCK, A, and MASON, M F A Comparison of the Effects of Heat and Those of Cold in the Prevention and Treatment of Shock 489
- STRUMIA, M M, and MCGRAW, J J Frozen and Dried Plasma for Civil and Military Use 489
- MIGLIETTA, M Anesthesia of the Stellate Ganglion in the Treatment of Postoperative Pulmonary Complications 490

Antiseptic Surgery, Treatment of Wounds and Infections

- HOMANS, J Minor Causalgia Following Injuries and Wounds 491

Anesthesia

- PINOTTI, O, and BACCAGLINI, G Changes in the Dynamics of the Circulation in the Course of Ether Narcosis and Spinal Anesthesia 491
- SMELOVSKI, V A Case of Arteriovenous Aneurysm of the Renal Artery Following the Lumbar Novocaine Block of Wischmiewsky 491
- PARAMONOFF, V A Anesthesia with Injections of Ether and Oil According to Toptschibascheff's Method 492
- WILLIAMS, A C, and MARCUS, P S The Choice of Anesthesia in Ludwig's Angina 492

Surgical Instruments and Apparatus

- HIRSHFELD, J W, and LAUBE, P J A Contribution on Surgical Masks 493

PHYSICOCHEMICAL METHODS IN SURGERY

Roentgenology

- NEWCOMER, E Comments on the Treatment and Sequelæ of Carcinoma of the Uterus 444
- STRAUSS, H, and MCGOLDRICK, J L Fracture of the Femoral Neck Following Roentgen Therapy for Gynecological Malignancy 446
- DEFINE ICHT, E Regarding Bipartite Os Navicularæ Pedis 467
- WESTERMARK, N A Roentgenological Investigation of Traumatic Lung Changes from Blunt Violence to the Thorax 494
- DOUB, H P, and JONES, H C The Roentgenological Diagnosis of Tumors Involving the Small Bowel 494

Radium

- TEAHAN, R W The Treatment of Carcinoma of the Breast by Interstitial Irradiation 495

MISCELLANEOUS

Clinical Entities—General Physiological Conditions

- WALKER, G F Injury and Internal Disease 497
- VERNETTI, L Vitamins and Reticulohistocyte System in the Healing Process of Wounds 497
- CORTESE, G Clinical and Experimental Contribution to the Study of Bursitis with Special Attention to the Etiopathogenetic Problem 497
- SCHAUMANN, J, and HALLBERG, V Koch's Bacilli Shown in the Tissue of Lymphogranulomatosis Benigna (Schaumann) by Means of Hallberg's Staining Method 498
- GOODWIN, L G, and FRYDLAY, G M Absorption and Excretion of Sulfonamides Applied Locally, Observations in Rabbits 498
- JUNG, W The Operative Treatment of Elephantiasis 498
- BAILEY, A A, and MOERSCH, F P Phantom Limb 499
- DODD, H, HECKES, J W, and GEISER, H Progressive Postoperative Gangrene of the Skin 501
- BASILE, A Is Surgery Justified in the Treatment of the Thymus for Pseudoparalytic Myasthenia Gravis? Clinical and Experimental Studies 501
- HEIMAN, J The Effect of Androgens and Estrogens on Spontaneous Benign Mammary Tumors in the Rat 501
- WOODHOUSE, D L Chemodiagnosis of Malignancy 502
- BROCKBANK, E M Mule Spinner's Cancer 503
- JOHNSON, A S, and LOMBARD, H L The Estimation of Operative Risk in Patients with Cancer 504
- KOZDOBA, A Z, and SCHWARTZ, E Y The Results of Surgical and Combined Treatment of Patients with Malignant Tumors 504

General Bacterial, Protozoan, and Parasitic Infections

- VACCAREZZA, R I, and GÓMEZ, J B Pulmonary Pictures in the Extrathoracic Forms of Tuberculosis 504

Experimental Surgery

- CRAMER, C D Experimental Thrombosis 505

Hospitals, Medical Education and History

- DAVIS, J S The Story of Plastic Surgery 505

AUTHORS OF ARTICLES ABSTRACTED

- A k rman I 40
 Ad h k E P 432
 Ag r l r P M 439
 Ahlbe g A 468
 Albright F 445
 Alterme e W A 43
 Andrews E 403
 Asc l R 456
 B agh i G 49
 B d L 468
 Bailey A A 499
 B ke T W 49
 B deira d M llo N 487
 Basil A 434 5 t
 B tes W 47
 Beck A C 450
 Beck C S 4
 Beck H 414
 B h d M 474
 Belgra o V 464
 B li g C A 43
 Belzendahl W 480
 Bened k A 448
 B nd A 43
 Blalock A 489
 B a me L 454
 B worth B M 465
 Bracle A N 486
 Brock k E M 53
 Brow J B 42
 B J S L 475
 Bru P 48
 Bru H 470
 Bury R E 437
 Calda E 45
 Caldwell G A 487
 Campello P 428
 Can gian T 469
 Carls C 439
 Carrell B 469
 Carrell W B 469
 Ca e H W 435
 Chaik f I L 45
 Changus G W 45
 Cleveland W H 44
 Colburn R F 4
 Collier F A 437
 Colombani S 463
 Co tesc C 497
 Cramer C D 50
 C eery C D 457
 Cro b A 473
 C r r n A R 43
 D Agostino M 41
 Dalgaard E C 472
 D vis J S 53
 De C lo J 454
 D Fun La ht f 467
 Del tala F 466
 D nstedt O F 473
 D M l f tta N 429
 Dodd H 51
 D be ty W B 412
 Doran, W T 44
 Do an W T Jr 440
 D b H P 404
 E la d L D 474
 E t man C 45
 Ern t M 488
 F rul J 467
 Feil H 42
 Findl y G M 498
 Fowle H A 453
 F a k H 43
 G l l e W E 47
 C user H 501
 Ge ll S 443
 Giffo d S R 4
 Goldm A 4
 Gém J B 54
 Goodall, J R 4
 Go dwa L G 498
 G eco A 47
 Grue ung P 46
 G L 466
 Gulek N 47
 G tm A B 438
 H lbe g V 498
 Halperin G 476
 H ang F M J 435
 H n se E C 449
 Ha j la O A 444
 H t B F 448
 Ha t J D 43
 H te A 480
 H les J W 5
 H m H 469
 H ma J 5
 H rnu ss K 45
 H dd f G 43
 H t l J H 46
 H irshfeld J W 493
 H l mberg L 466
 H m s J 49
 H yse k L 467
 Hyman A 455
 Ivy R H 479
 Jacobell P 434
 J c b M H 44
 Jac hso S A 46
 Jc H 44
 Jim o v d l l 483 486
 J hn n A S 54
 J nes, H C 494
 J d f P 476
 Josephson, B 438
 J g W 498
 Kartavin V A 45
 Kay E B 437
 Kuchne O 448
 Kirschne M 46
 K rn P G 463
 K d ba A Z 504
 Larss H 438
 Latt o R 433
 La b P J 403
 Le W E 476
 Le te H E 455
 Le e th l M L 445
 Le s K M 44
 L bert V 464
 Logrosac D 47
 Lomb d H L 54
 L cia S F 439
 Lu sche A 459
 I nd C J 45
 M cl tyr R S 437
 M g t R 47
 M c s P S 492
 M sch H A 46
 M so M F 489
 M th s D N 477
 M Dowell F 42
 M Goldr k J L 446
 McG w J J 489
 M L h S 438
 Mc ly R W 441
 M le y F L 43
 M ch l wsky B 446
 M gli tta M 490
 M lha R 41
 M illetta, M 435
 M ch F P 499
 Moo P L 486
 M ey R D 448
 N wcom E 444
 N o gaa d f 442
 Ols A 45
 Orm od f C 4
 Orm d J K 460
 Osborne D E 473
 P m f f V A 49
 P rra M 4
 Patt G D 448
 Pet S 44
 Pin tt O 49
 Plotke F 44
 P ppe H L 44
 P in C L 460
 Rag s A B 44
 Ratzenh fe M 444
 R R L 4 478
 Rech M 446
 Reich rt F L 45
 R ss C 46
 Rh ads J E 46
 R h rison A M 445
 R L 441
 Roch M N 473
 Rose B 475
 Ross C 472
 Saland G 47
 Scarbo gh H 473
 Schae H 473
 Schaum J 408
 Scherschev D 446
 Schmidt E R 432
 S broede C H 43
 Schult A 436
 Schulz W 480
 S hwa tz E Y 504
 Sh pm S 4
 Sm lo ski V 491
 Sm th D W 437
 Sm th P H 445
 Sol m E M 44
 S nyak N G 434
 Sp r L C B 44
 Stansfield H 473
 St r A 43
 St ne H B 438
 St rck A H 45
 Stout R A 479
 Stra ss H 446
 Strumia M M 489
 T yl F S 45
 Te b R W 49
 T mp sta F 435
 Teso A 433
 Thom A H 45
 Thompso J E 435
 T rp R 443
 Turn G 482
 V car R F 54
 V schts h key N A 4
 V rnett L 497
 V tk S F 43
 W lk G F 497
 W lt rs W 44
 W rr k W D 457
 W l P G 475
 Wen l H 477
 West rna k N 494
 W te d l P 447
 Wh te E C 46
 Williams A C 492
 W lf J F 420
 W lf W A 476
 W dh l B 410
 Woodh se D L 5

CONTENTS—DECEMBER, 1941

PRINCIPLES OF SURGICAL PRACTICE

- The Management of Acute Perforated Appendicitis—Panel Discussion VERN C HUNT, M D, F A C S, Los Angeles, California Presiding Collaborators WILLIS D GATCH, M D, F A C S, Indianapolis, Indiana LAWRENCE S FAHIS, M D, F A C S, Detroit, Michigan, and HENRY K RANSOM, M D, F A C S, Ann Arbor, Michigan 507

COLLECTIVE REVIEW

- The Treatment of Pain in Carcinoma of the Cervix R W POSTHILWANT, M D, New Martinsville, West Virginia 513

ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

Head

- STEVENS, J B Osteomyelitis of the Frontal Bone, Report of 3 Challenged Cases 517
ANHUSSEN, G The Treatment of War Wounds of the Face and Jaws 578
DRHOLLANDER, W Roentgen Irradiation of Cellulitis, Especially of the Face and Neck 591

Eye

- CHRYN, H, and BELLONS, J G The History of the Crystalline Lens 517

Ear

- YOUNG, N Bleeding from the Ear as a Sign of Leaking Aneurysm of the Intracranial Portion of the Internal Carotid Artery 518
SHAMBALGH, G L, JR Involvement of the Jaw Joint in Acute Suppurative Otitis Media 518
WILLIAMS, H L, BROWN, A F, HOFFRELL, W J, and RALPH, R D Sulfonamide Therapy for Acute Otitis Media and Mastoiditis 519
NASIELL, V Modern Treatment of Otosclerosis 520

Neck

- FERRARI, R C, LENTINO, A, and ILLMING, L A Clinical Consideration of Total Laryngectomy 520

SURGERY OF THE NERVOUS SYSTEM

Brain and Its Coverings, Cranial Nerves

- ASCROFT, P B Traumatic Epilepsy After Gunshot Wounds of the Head 522
LASSEN, H C A, and VANGGAARD, T Spontaneous Subarachnoid Hemorrhage 522

- LUTJOW, L T, CAPR, A D, and WATTENBERG, C Spontaneous Cerebral Hemorrhage 522
CAPRITTO, R Cisternal Hernia of the Paramedian Line 523
INGRAHAM, I D, and CAMPBELL, J B Dangers of Radiation Without Biopsy of Brain Tumors in Children 523
MUNRO, D Pain in Cancer of the Face, Jaws, and Neck 524
DANDY, W F Results of Removal of Acoustic Tumors by the Unilateral Approach 524

Spinal Cord and Its Coverings

- QUIRADA, J J The Technique, Indications, and Results of Myelography 524
BROWDER, J, and MURPHY, R Pyogenic Infections of the Spinal Epidural Space 525
LECHOLS, D H Emergency Laminectomy for Acute Epidural Abscess of the Spinal Canal 526
DI GENNARO, R Chordotomy 526
PRIPIER, H Bullet Injuries of the Spinal Cord and Their Management 579

Peripheral Nerves

- GIANGRASSO, G The Use of Rubber Lamine in Plastic Bridging of Experimental Nerve Lesions 526
SEAJAN, K Hyperalgesic Zones in the Soft Parts Around the Pelvis as a Symptom from the Plexus Hypogastricus 551

Sympathetic Nerves

- NICOLAST, G Gastroduodenal and Hepatobiliary Circulatory Disorders Following Lesions of the Abdominal Sympathetics 527

SURGERY OF THE THORAX

Chest Wall and Breast

SAPHIR O A d PARKER M L M t t a of P
mry Crc m f th B e t with Spe al
R f r e c to the Spl e Adr l Gl d a d
Ovar s

ALBRECHT L H al g i Cance us B ts Rad
cally Operated upo betw n 19 7 a d 1939 th
Goetting n U n i v e r s i t y S g c l C l i n i c with
R f r e c n c e to P e Operat e a d P s t p at
Irr d at on

Trachea Lungs and Pleura

ELOESSER L The Ch c f Proc d r in the T at
me t of Tub r c l o C v i t e s

BROCK R C Drain g f th Pleura

Heart and Pericardium

MO TA ARI G a d J A D E V A I A F S g c l R e a
cul n z t o n f th H t

Esophagus and Mediastinum

I V A N S S E T C H O F E R R A R I R C a d L E T T I N O A
S Th S g l T r u t l f C r f the
Esoph gus.

Miscellaneous

H E R R I G T O S W D phragmati H r m i a

TABANELLI M A Clinical St dy of the Th r co-
Abd mun l R l l e s Aft Traum to th P n t al
Th

S C A D O N G J G Som A p e t s of Cl sed W nd of
the Chest

WHITE B M s s R t g n g r a p h y f th Th r a x
with Spec l R f e t l t A p p l c t u t R e
cru t s f r th Army

SURGERY OF THE ABDOMEN

The M n g m n t f Acut P f rated Appen d i t i s -
P l D s c s s n V E R N E C H i t T M D
F A C S Los Angel s Cal f r m a P e s d g
C l l b o r a t r s W I L L I D G r c h M D F A C S
I d p o l I d a L A W E E S F A L L I S
M D F A C S D t t M c h g n n d H E R R
K R A S O M M D F A C S A A b o M t
S

Abdominal Wall and Peritoneum

R O I S C R Why l g u l H r m i a C u r s

Gastro-Intestinal Tract

L U D D E N J B F L x E R J d W i H T I S
Stu d e s A s c b A c d D s c y n G t
D i s s e s l d D g n o s n d T t m e n t

B U S O N M I c t l C o n d r a t s i n th E a l y
D i a g n o s i s f G a s t r i c C a c t m

F R E E R E F Th Late Res l t s n A c t P f r a t e d
I e p t i U l c T t e d b y S u m p l S t u

M A T R O V N G Th Diagno s f Chron c C stro-
duodenal Ul r s Bas don s o o l d cal G s t r e c
R e c t i o s

C H I S S E R I N I A R d i c a l I t e r v n t n f r D u o d n l
T u m

V A R C O R L H A L J a d S t v e s B Th
V a l u e f th L o c a l I m p l a t a t n f C r y s t l l e
S u l f a n l m d e A b o u t G t o l t e s t i n a l A
t o m o s e s n D o g s

A D L E R H F A T K L T O A J d I v A C A
S t d y f th M t l t y f the H m n C o l o A
E x p l n a t o n of D y s s y n e r g i f the C l o r f
th U s t a b l e C f

F I S O M K A a d F E R G U S O N L K A n A p p r a s a l
f the M e d i c a l V e r s u s th S u r g i c a l T r e t m t
f I d p a t h c U l c e r t e C l i t s f l l o w u p D t a
o n 50 C s e s

B O Y C E F F A c u t A p p e d c t i n M i d d l a d L a t e
L i f A A l y s i s of 42 C s e s i I d d a l
O e r T h i r t y N i n Y e r s of A g e

D U L Z H L V A A E D P t h l g A a t m c l
C h a g s A d j i n g O r g a n s d T i s s i n
A c u t e A p p e d c t s

W A L L D E N L The R o n t g n D g n s of G a l l S t o
l l s

Liver Gall Bladder Pancreas and Spleen

S A P H I R O A d P A R K E R M L M t t t f P r i
m r y C a r c i n o m a f the B a t with S p e c i a l
R e f e r n c e to the S p l e e n A d r e n a l G l n d n d
O n s

F A G E R R O E F A G E R R E R C S E n d F A H R A E S
R H y p e m S p l e m g l y I r e a d H e
m o l y s i l r e a s f f B r i g e d A e l r t e d
S e d i m e n t a t o f th R e d C l l

F E H A N C The P t h l g y of P r i m r y C c m a f
the L i e i n the B a n t u R c e of S u t h A f a

S E I L A M n d C O M F O R T M W The l c d c
a n d D g n s f P a c r t c L t h a s A R e e w
of 8 C a s e

T J E I N A F O T H E R I N G H A M W R p t f th S p l
i T w S t g s S p o t e o u R p t u

Miscellaneous

N I C K I G G S t r o d d l a d H p a t l a l C
l a t r v D s o d e r s F o l l g L e f th
A b d o m i n a l S y m p a t h t i s

P E T R I S J S E N I U S H a d T h s e n E E x p e
m e n t a l S t u d e s o n th P r o d t f P r u s
A m i a b y O p e r a t t h D g s t e T r a t
R l l f C m b e d E l t e R e s e c t i f th
P y l o r u a n d th B u n n r G l n d S e c t i n of th
D o d e n m a d the D t a l T w o - T h i r d of th
S m a l l I n t s t i n e n P u p s

G O R D O N T A Y L O R G A b d o m i n t h c I n j n e s

GYNECOLOGY

The T e a m a t f f P n C a r o m a of th C r v i x
C l e c t R v i w R W P O S T L E T H W T M D
N e w M r t v i l l W e t V a r g i

Uterus

BREWER, J. I., and JONES, H. O. A Study of the Corpora Lutea and the Endometrium in Patients with Uterine Fibroids 549

PAPANICOLAOU, G. N., and TRAUT, H. I. The Diagnostic Value of Vaginal Smears in Carcinoma of the Uterus 549

BOWING, H. H., and McCULLOUGH, J. A. I. Carcinoma of the Cervix Uteri in Childhood and Adolescence 549

GALLAVHER, L., and NATALE, P. Statistical Studies on the Value of Roentgen Therapy by the Method of Counting in the Treatment of Cancer of the Uterus 501

Adnexal and Peruterine Conditions

SAPHIR, O., and PAPKOFF, M. L. Metastasis of Primary Carcinoma of the Breast, with Special Reference to the Spleen, Adrenal Glands, and Ovaries 548

KANTOFF, A. L., and KLAUWS, A. H. Arrhenoblastoma of the Ovary 550

External Genitalia

DI PAOLA, G. Vaginal Cytology and Ovarian Function in Woman 551

Miscellaneous

SKAJAN, K. Hyperplastic Zones in the Soft Parts Around the Pelvis as a Symptom from the Plexus Hypogastricus 551

IRAEKEL, L. Three Years of Gynecological Endocrinology, with Some New Observations 552

LIPSCHUTZ, A., and MARCUS, L. The Prevention of Experimental Fibroids by a Cortical Hormone, Experiments with Desoxycorticosterone 553

OBSTETRICS

Pregnancy and Its Complications

PIROLI, G. Daily Variation of the Blood Urea in Albuminurias of Pregnancy 554

CUZZA, T. A Study of Hepatorenal Function in the Toxemias of Pregnancy 554

KAPELLER-ADLER, R. The Histidine Metabolism in Normal and Toxic Pregnancy. The Excretion of Histidine in Normal Pregnancy Urine, and in the Urine of Patients with Toxemia of Pregnancy 554

KAPELLER-ADLER, R. The Significance of the Isolation of Histamine from the Urine in the Toxemia of Pregnancy 555

BLAZSÓ, S., and DUBRAUSZKY, V. The Role of the Vasopressor and Anti Diuretic Hormones of the Posterior Lobe of the Hypophysis in the Pathogenesis of the Late Toxemias of Pregnancy 555

Labor and Its Complications

PAUCOR, H. The Indications and Technique of the Test of Labor 555

Puerperium and Its Complications

CAFFARATTO, T. M. Puerperal Thrombophlebitis 556

Miscellaneous

NEUWEIER, W., and STICKEL, A. Polypeptides in the Serum during Normal Gestation, Labor, and Gestosis 557

KRIEGER, V. I., and ROME, R. Mch. Toxic Pregnancy in Relation to Subsequent Pregnancies, with Special Reference to Renal Function Tests 557

STAPROFF, O. Placental Transmission of Trypanosoma Brucei 558

GENITO-URINARY SURGERY

Adrenal, Kidney, and Ureter

SAPHIR, O., and PAPKOFF, M. L. Metastasis of Primary Carcinoma of the Breast, with Special Reference to the Spleen, Adrenal Glands, and Ovaries 528

DATT, F. Masculinizing Tumor of the Left Suprarenal Gland with Metastases to the Liver and the Aortic Lymph Glands 559

HINDENBERG, T. The So Called Spontaneous Perforation of the Kidney Pelvis 560

NASTROM, T. G. Malignant Tumors of the Kidney in Children 560

BESSIE, I. L. The Role of the Adrenal Glands in Shock, the Value of Desoxycorticosterone Acetate in the Prevention of Operative Shock 584

Bladder, Urethra, and Penis

BACH, J. W. Pezomene's Disease or Fibrous Cavernitis, Some Observations 561

Genital Organs

FRANCO, A. A Case of Tumor of Leydig's Cells with a Discussion of the Known Cases of Hyperplasia of the Interstitial Gland of the Testicle 561

Miscellaneous

HAMMOND, F. I. Genital Tuberculosis in the Male 562

ROSS, M. F. The Initial Lesion of Granuloma Inguinale 562

YOUNG, H. H., HILL, J. H., JEWETT, H. J., and SATTERTHWAITE, R. W. Sulfacetamide Toxicity and Efficacy in Gonorrhea and Urinary-Tract Infections. Preliminary Report 562

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

Conditions of the Bones, Joints, Muscles, Tendons, Etc

NATHANSON, I., and COHEN, W. A Statistical and Roentgen Analysis of 200 Cases of Bone and Joint Tuberculosis 564

URBAN, V. A Follow Up Study of the Effects of Vertebral Osteosynthesis in the Treatment of Tuberculous Spondylitis 564

SUNDELIN, F. Gold Therapy in Chronic Arthritis, with Special Consideration of the Complications 564

KING, E. S. J. Malignant Tumors of the Tendon Sheaths 566

- GIANGRASSO G Experimental Peritendon Plastic
with Rubber Sheets 567
- HOWES W F and SCHENCK S G Rotational
Callosities of the Digits and Tarsals
Treatment of Primary Malignant Bone Tumors 589
- CAMP J D and McCULLOUGH J A L Pseudo-
arthrosis in Diseases Affecting the Skeletal System 590
- KNUTSON F R Rotational Gynecomastia of the Femoral
Arteriovenous Anastomosis of the Knee 59
- DENSTADT Thrombotic Thrombocytopenic of the Bone
Marrow 593

Surgery of the Bones Joints Muscles Tendons Etc

- FARILL J S Ilizarov's method in Osteoarthritis Surgery 567

Fractures and Dislocations

- MAROTTA O R Pseudarthrosis of Cervical
Spine Treated by Bone Graft 567
- SEVERIN E Congenital Dislocation of the Hip Joint
Late Results of Closed Reduction of Acetabular
Fractures of Recent Cases 568
- CAGNOLI H The Treatment of Fractures of the
Femoral Shaft by Casts 569
- INCLÁN A TARAP J J and SÁNCHEZ TOLEDO P
The Treatment of Fractures of the Femoral
Neck 57
- WILSON P D The Treatment of Compound
Fractures of the Forearm 58

SURGERY OF BLOOD AND LYMPH SYSTEMS

Blood Vessels

- STENS J B Ocular Myofascial Fibrosarcoma
Repaired by Clot and Suture 57
- MONTAN I G and DEVAIA F S Glomerular
Sclerosis of the Kidney 59
- CAFFARETTO T M Peripneumonic
Pneumonia 556
- REBEDI F and GUARDACCI C Peritonitis
of the Abdomen 57
- OLLIGER P Thrombocytopenia of the
Thrombocytopenic Blood 583

Blood Transfusion

- LAEBER G and FAGER S Transfusion
of Human Splenic Marginal Sinusoidal
Blood into the Reticular System 538
- PETERSON J and HADTHORN E Transfusion
of the Blood in the Production of
Anemia by Operation of the Ductus
Tortuosus of the Esophagus Resection of the
Pylorus of the Brain Glioma of the
Dorsal Medulla of the Tail of the
Snake 54
- HARRISON G and PICKER L E R Quaternary
Antibiotic Treatment of Hemorrhagic
Dysentery of the Dog 57
- BALLER M Myocardial Infarction of the
Heart 57

- FISCHER R and JEANNERET H Thrombophlebitis
of the Brachial Plexus of the Limbs 573
- MABONEY E B KINGSLEY H D and HOWLAND
J W The Therapeutic Value of Preserved Blood
Plasma 573
- Lymph Glands and Lymphatic Vessels 590
- BARNES J M and TRUETA J Absorption of
Tetracycline from the Tissues
Importance of the Lymphatic Circulation
in the Absorption of Chemical Substances
Venous Thrombosis of Lymphatic Flow in
Inflammation 574
- WALSH J C and MEDLAR E M Acute Myelogenous
Leukemia 574

SURGICAL TECHNIQUE

War Surgery

- ASCROFT P B Treatment of Epilepsy After
Wounds of the Head 572
- GUERMAN S A Clinical Study of Penetrating
Wounds 576
- WEBER M R The Results of Primary Treatment
of Wounds of the Face and Neck
Types of Wounds in the
Battlefield 576
- ROEDER L KENNEDY H W and SIMPSON W M
Refraction of the Cornea in Infection
by Chemical Agents of the Eye
Chemotherapy 577
- REED G B and DORR J H Rapid Identification
of Gas Gradients 577
- BOTTER L R Surgical Problems of the
Anus 578
- AXHUS G The Treatment of Wounds of
the Face 578
- PAPER H B and IJZER of the Spinal Cord
Their Management 579
- WHITE B Mass Radiography of the
Thyroid Gland of the Army 579
- SCARDE G J G Smaper of Clinical Wounds
of the Chest 58
- BROCK R C Drainage of the Pleura 58
- CROFT LOR G Abdominal Hernia 580
- PETERSON D H and ROSS J D Complications
of the Treatment of the
Thyroid Gland of the
Face 58
- WILSON P D The Treatment of Compound
Fractures of the Forearm 58
- HARRIS H N The Treatment of Shock Wounds 58
- MITCHELL G A G LOCKIE N J and HADLEY
R S Clinical Management of the
Lymphatic System of the
Body 58
- DOUGHERTY S J V MURPHY J C A Ros-
sini and D. D. C. J. Thrombosis
of the Circulation of the
Thrombotic System 583

Operative Surgery and Technique, Postoperative Treatment		HOWES, W. E., and SCHENCK, S. G. Roentgenological Considerations in the Diagnosis and Treatment of Primary Malignant Bone Tumors	589
OLLINGER, P. The Influence of the Trauma of Operation on the Venous Blood Pressure	583	CAMP, J. D., and McCULLOUGH, J. A. L. Pseudo-fractures in Diseases Affecting the Skeletal System	590
B. SSER, E. L. The Role of the Adrenal Glands in Shock, the Value of Desoxycorticosterone Acetate in the Prevention of Operative Shock	584	KNUTSSON, F. Roentgenology of the Femoropatellar Articulation and a Good Projection of the Knee	590
DUNPHY, J. E., and GIBSON, J. G., and The Effect of Replacement Therapy in Experimental Shock	584	CAUBARRÈRE, N. L., and CASSINONI, M. Roentgenotherapy of Inflammatory Processes	590
Antiseptic Surgery, Treatment of Wounds and Infections		DEHOLLANDER, W. Roentgen Irradiation of Cellulitis, Especially of the Face and Neck	591
STARKOFF, O. Placental Transmission of Trypanosoma Brucei	558	ANGEVINE, D. M., and TUGGLE, A. The Effect of Roentgen Therapy upon Infections Produced in the Skin of Rabbits with Cultures of the Streptococcus Hemolyticus and Staphylococcus Aureus	591
SOMMER, R. The Prophylaxis of Tetanus	585	GALLARRESI, L., and NATALE, P. Statistical Studies on the Value of Roentgen Therapy by the Method of Countard in the Treatment of Cancer of the Uterus	591
BOTTO MICCA, A. Camel-Bite Lesions	585	GLUCKSMANN, A. Preliminary Observations on the Quantitative Examination of Human Biopsy Material Taken from Irradiated Carcinomas	592
HAWKING, F. Local Concentration of Sulfonamide Compounds Inserted into Wounds, Maximum Concentration in Wound Fluids, Concentration in Distal Parts of a Wound and in Tissues around a Wound	585	HENSHAW, P. S. The Induction of Multipolar Cell Division with X-Rays and Its Possible Significance	592
CAUBARRÈRE, N. L., and CASSINONI, M. Roentgenotherapy of Inflammatory Processes	590	Radium	
ANGEVINE, D. M., and TUGGLE, A. The Effect of Roentgen Therapy upon Infections Produced in the Skin of Rabbits with Cultures of the Streptococcus Hemolyticus and Staphylococcus Aureus	591	FRICKE, R. E. The Treatment of Non-Malignant Conditions with Radium	593
Anesthesia		Miscellaneous	
SHUMACKER, H. B., JR. Reactions to Local Anesthetic Agents. Experimental Studies with Procaine, and a Clinical Report	586	DENSTAD, T. The Radiosensitivity of the Bone Marrow	593
BAILEY, H. Cardiac Massage for Impending Death under Anesthesia	587	MISCELLANEOUS	
SCHNEEDORF, J. G., LORHAN, P. H., and ORR, T. G. The Problem of Anoxia in Surgery and Anesthesia, Report of Experimental and Clinical Cases, and a Review of the Literature	588	Clinical Entities—General Physiological Conditions	
PHYSICO-CHEMICAL METHODS IN SURGERY		STENSTROM, T. Foot and Mouth Disease in Man in the Light of the Most Recent Research	595
Roentgenology		LORIZIO, V. Postoperative Fibrinolysis	596
ALBRECHT, L. Healing in Cancerous Breasts Radically Operated upon between 1927 and 1939 in the Goettingen University Surgical Clinic, with Reference to Pre Operative and Postoperative Irradiation	528	REDING, R. An Attempt to Determine the General Conditions of Predisposition to Cancer	596
BOWING, H. H., and McCULLOUGH, J. A. L. Carcinoma of the Cervix Uteri in Childhood and Adolescence	549	SPINELLI, A., and ROHONCI, G. The Influence of Heredity, Age, and Certain External Agents on the Pathogenesis of Malignant Tumors	597
NATHANSON, L., and COHEN, W. A Statistical and Roentgen Analysis of 200 Cases of Bone and Joint Tuberculosis	564	General Bacterial, Protozoan, and Parasitic Infections	
WALLDÉN, L. The Roentgen Diagnosis of Gall Stone Ileus	580	DAVIS, M. I. J. An Analysis of 46 Cases of Actinomycosis, with Special Reference to Its Etiology	597
		Ductless Glands	
		MIOTTI, T. Studies on Modifications of the Genitalia in the Female Guinea-Pig by the Action of Prostatic Extracts	598

INDEX TO VOLUME 73

I Subject Index

II Author Index

AUTHORS OF ARTICLES ABSTRACTED

- Adl r H F 536
 Alb echt L 58
 Ang in D M 59
 A cr ft P B 522
 Atkinson A J 536
 A hau.e C 578
 Bailey H 587
 Balaguer M 57
 B mes J M 574
 Be ch E W 561
 Bell ws J G 57
 B rman C 538
 Besse E L 584
 Blasó S 555
 Bott Mcca A 585
 B w g H H 549
 B yce F F 537
 Brew J I 549
 B ock R C 580
 B oster L R 578
 Brown J 55
 Brown A E 59
 Bu sso M 533
 Caffaratt T M 556
 Cag I H 569
 Camp J D 590
 C mpbell J B 53
 C rr A. D 52
 C rullo R 523
 Cass n nu M 590
 Ca b rre N L 590
 Chi s rin A 535
 Chunn H 57
 C he W 564
 Comfo t M W 539
 C idz T 554
 C ndy W L 524
 D ti T 559
 D us M I J 597
 D Ge n ro R 56
 D H ll d r W 59
 D luech J 583
 D n tad T 593
 Da P la G 55
 D Ol r Esté es J V 583
 D bra s ky V 555
 D phy J E 84
 Dvu hln va F D 537
 Ech l D H 56
 Floess r L 59
 Fl om K A 536
 F g b g E 538
 Fag be g S E 538
 Fähr a u R 538
 Fallis L S 597
 F rill J 567
 Fe gu o L K 536
 Ferrari R C 5 529
 F alth A 561
 Fisch R 573
 Fl mung E 50
 Fle n J 533
 Fra kel L 552
 Frick R E 593
 F low I T 52
 G llavres L 591
 G ad W D 57
 G ngr so G 56 567
 G bso J G nd 584
 Gl eck m n A 593
 Go d n Taylo G 580
 G a d cca G 572
 G rman S 576
 H rrm nd T E 56
 H ndl y R S 58
 H kins H N 58
 H rruigt n W 53
 H rso G A 57
 H wking F 585
 H y L J 53
 H d lbe g T 560
 Hen haw I S 59
 H rr ll W E 59
 Hill J H 56
 H w W F 589
 H w l d J W 573
 Hunt A C 57
 I lán A 57
 I g ham F D 53
 I s ch O 59
 Ivy A C 536
 Jad ia F 520
 J r t H 573
 Je eni s H 54
 J w tt H J 56
 J H O 549
 K t A E 55
 K pell Adl R 554 555
 K d ll H W 577
 Kt g E S J 566
 Kt g ley H D 573
 Kl w s A H 550
 K utso F 590
 Kri ge V I 557
 Lass H C A 52
 L ntino A 50
 Lent A S 59
 Lipsch etz A 553
 Log e J 582
 Lo h P H 588
 Lorzio V 596
 Ludd n J B 533
 M h ey E B 573
 Ma tro N G 534
 Ma 6tt li O R 567
 McCullo gh J A L 540
 590
 Medl E M 574
 M yers R 55
 M ttu T 593
 M t h ll G A G 5
 M tanar G 59
 M j c J C A 583
 M ro D 54
 Nas ll V 52
 Natal P 59
 Nathanso L 564
 N uw l W 557
 N c l G 57
 N ystrom T G 560
 Olln er P 583
 Orr J H 577
 Orr T G 583
 P p c laou G N 549
 Pa l r E E 534
 P k r M L 58
 P tey D H 58
 Pa t H 55
 P p H 59
 I tri S 54
 I k L F R 57
 P l G 554
 I t l thwa t R W 543
 Q zad J J 54
 R lph R D 59
 R som H K 7
 R ba d F 57
 R d g R 596
 R d G B 577
 R be tso J D 58
 Robins C R 53
 Robo i G 597
 R me R Mch. 557
 R se D L 577
 Ross M E 582
 R gn l L 583
 S a b Toled F 57
 Saphir O 58
 Satterthwa t R W 56
 Scadding J G 580
 S h k b G 589
 Sch edorf J G 588
 S ri E 568
 Shambaugh G E Jr 58
 Shum ke H B J 580
 Sumps W M 577
 Sk jaa K 55
 ell A M 539
 Somm P 585
 Spau ll A 597
 Stark ff O 558
 St tröm T 595
 Steve s B 53
 St e s J B 57
 Stucki A 557
 S d li F 564
 T b ll M 531
 T rafa J I 5
 T j n F th n gh m W 541
 Thynse E 541
 T a t H F 549
 Tru ta J 574
 Tuggl A 591
 U ba V 564
 V ega d T 5
 V o R L 35
 V g L 553
 W lid L 589
 Wai h, J C 574
 W tt be g C 52
 Web M R 576
 White B 579
 W ll m H L 59
 W l P D 58
 Wright I S 513
 Y u H H 50
 Y u g N 518

INTERNATIONAL ABSTRACT OF SURGERY

VOLUME 73

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NUMBER 1

PRINCIPLES OF SURGICAL PRACTICE

THERAPEUTIC CONSIDERATIONS IN ACUTE OBSTRUCTION OF THE SMALL INTESTINE

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ACU TE intestinal obstruction may be defined as the condition in which there is the more or less sudden cessation, partial or complete, of the normal forward motion of the intestinal content, from whatever cause, for a period long enough to produce local and general pathological changes. Acute obstruction is essentially, therefore, intestinal stasis of such degree that it causes pathological alterations not only in the obstructed bowel segment but elsewhere in the body as well. And it is from these alterations that the signs and symptoms occurring in acute obstruction arise. Whatever the specific causal agent responsible for production of the obstruction may be, it can only produce the degree of stasis of intestinal content sufficient to constitute obstruction in one, two, or all of three ways.

(1) By occlusion of the intestinal lumen so that an actual mechanical barrier is set up against the normal forward progress of the bowel content.

(2) By reduction of intestinal peristalsis, in which case the normal propulsive power of the intestine is decreased to a point inadequate for further motion of the substance contained in the lumen.

(3) By embarrassment of the circulation to the intestine to such a degree that the peristalsis becomes inadequate and the intestinal lumen insufficient for passage of its content.

Occlusion of the intestinal lumen of whatever degree may be caused by agents within the lumen itself, within its walls, or from without (35), occlusion is consequently intraluminal, intramural, or extramural. Peristaltic failure is occasioned by disturbance in the nervous mechanism initiating and maintaining propulsive peristalsis (5, 23) or by interference with the efficiency of the musculature of the bowel (28) so that its capacity for contractile response to its innervation is reduced, or by both. Such nervous and muscular failure may follow trauma, inflammation (30, 32, 39), or interference with the blood supply. It is obvious that circulatory embarrassment complicating the obstructed portion of the bowel greatly increases the liability to fatal consequence. When the circulation of the blood to the obstructed part is reduced, the viability of the part supplied is decreased, and if the circulatory failure to the bowel is complete enough or persists for a sufficiently long period, necrosis of the intestinal wall is the result, with discharge of the contents of the obstructed bowel into the peritoneal cavity. There is evidence, however, which suggests that it is not necessary for the bowel wall actually to perforate before bacterial invasion of the peritoneal cavity can occur (24, 19). Compromise of the blood supply is most frequently encountered when the cause of the obstruction is mechanical, such as observed in volvulus, intussusception, and closed-loop obstructions due to adhesions or hernias. In these instances the cause of the obstruction is also the cause of the circulatory embarrassment and

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occurs with it since the same mechanism which occludes the intestinal lumen also interferes with the circulation to the occluded part by impingement upon its vessels. In addition circulatory changes and associated edema may even further impair the activity of the bowel musculature commensurately diminishing its capacity for effective peristaltic action.

It is apparent that it is not necessary for the intestinal lumen to be completely occluded the peristalsis to be totally inactive or the circulation to be wholly embarrassed for stasis to supervene. Obstruction or stasis may be the net result of the concurrent operation of partial occlusion, partial peristaltic failure and partial circulatory embarrassment whereas the operation of any one of these factors alone might not be sufficient to produce obstruction. It is also evident that obstruction arising solely from one of the foregoing causes tends if the obstruction persists long enough to be accompanied by the other causal factors which increase it. In brief occlusion of the lumen, peristaltic failure and circulatory embarrassment tend to produce each other. For example, an obstruction produced by an adhesive band constricting the lumen of the bowel creates an occlusion which arrests the normal forward motion of the bowel content and distention results which ultimately dilates the segment of bowel above the obstruction and interferes with the peristalsis in that segment; this further increases the stasis so that to the original causal agent of occlusion of the lumen is added the additional factor of inadequate peristalsis. Conversely the original cause of the obstruction may arise from peristaltic failure due to trauma; the inadequate peristalsis produces stasis of the bowel content with distention to such an extent that the bowel wall becomes turned upon itself or otherwise anatomically altered to produce an actual mechanical occlusion of the lumen and the obstruction originally occasioned by simple

peristaltic failure alone now has the additional contributory factor of actual mechanical occlusion of the lumen. In addition the circulation to the obstructed bowel may at any time be compromised and thus further accentuate the peristaltic deficiency or the mechanical occlusion by the changes which it induces in the segment supplied. However difficult the classification of intestinal obstruction may be, a practical formulation can be devised upon the principal physiological factors alone, namely: the degree of patency of the intestinal lumen, the activity of the peristalsis and the adequacy of the circulation. Since every case of obstruction must present pathological alteration in the intestinal lumen, peristalsis or circulation, these may serve as common denominators by which all cases may be classified regardless of specific etiology. The fact that a primary cause of stasis or obstruction tends to engender secondary conditions which further it can also be recognized in such a system and the progressive nature of the condition can be illustrated. Such classification is here presented in an attempt to correlate the relationship of the various types of obstruction to one another and the effect produced (Fig. 1). However produced by occlusion of the lumen or by peristaltic failure, once stasis supervenes its resultant signs and symptoms consequently appear. The common factor in all cases of acute obstruction is intestinal stasis which accounts for the clinical findings.

In addition changes in the circulation and associated edema may even further impair the activity of the bowel musculature and commensurately diminish the capacity for effective peristaltic action. The inevitable consequence of stasis of the intestinal content: distention of the bowel segment in which the stasis is extant and it is this distention which is largely responsible for the pathological effects observed (17, 4, 34). In brief the effects of intestinal stasis or obstruction are the effects of the distention incident to the

ACUTE OBSTRUCTION OF THE SMALL INTESTINE

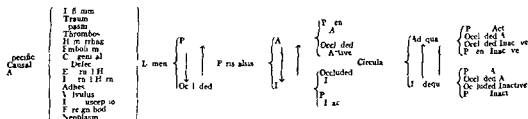


Fig. 1. Shows with schematic for classification of all types of intestinal obstruction factually as well as etiologically.

stasis, and not the stasis *per se*. Distention is begun and increased in the static bowel segment by the progressive accumulation of gas and fluid within the intestinal lumen. The gas accumulation is principally accounted for by swallowed air, to a lesser degree by gaseous interchange with the blood, and to a small extent by the gaseous products of bacterial action on the arrested intestinal content (25, 18). The excessive amount of fluid is the result of unabsorbed intestinal secretions from the proximal reaches of the gut above and at the site of obstruction, while it is further augmented by distention itself which serves as a stimulus to increased secretion from the walls of the bowel (17). The distention incident to stasis begins within the obstructed segment and is always progressive, it tends to involve gradually more and more of the bowel proximal to the obstruction from below upward. In the early stages when distention is moderate, it may serve as a stimulus for increased peristaltic activity. Ultimately, if unrelieved, the whole extent of the bowel above the site of obstruction becomes greatly distended, and the local effect of such distention is to impair motility further, not only in the obstructed area but in the segments of uninvolved gut above it. In addition, it causes a markedly deleterious effect on the circulation of all parts of the bowel where it is prevalent, as it impairs the nutrition and diminishes capacity for peristaltic action (36, 27, 9, 28, 13).

Further, excessive distention of the bowel, like distention of any hollow viscus, serves as an intense stimulus for subjective pain sensation referred to the abdomen. The effects of distention other than local, warrant particular consideration since their direct and indirect consequences affect the entire body. Among the general constitutional manifestations of intestinal distention is the loss of chloride occasioned by the severe vomiting and loss of fluid into the bowel (8, 2). Depletion of the blood chloride is for a time compensated for by the retention of bicarbonate to maintain electrolytic equilibrium. However, as the chloride loss continues, ultimately sodium is excreted by the kidney in increasingly greater quantities to further restore the disturbed electrolytic balance. This loss of sodium exerts a profound effect on the water balance of the body, since it is primarily the sodium which controls the retention of water in the tissues (3, 10, 11). For this reason the loss of sodium causes proportionately severe water loss from the tissue and marked dehydration results. The dehydration is further accentuated by the continued loss of fluid in the intestinal secretions of the distended bowel. Dehydration so produced is manifested by

hemoconcentration and reduced blood volume. Dehydration of the blood occurs first. This loss of fluid from the circulation is made up at the expense of the interstitial fluid reservoir and when it is exhausted the fluid of the cells of the tissues themselves stands in danger of depletion (12, 33). The intracellular fluid can be reduced only slightly, if at all, without causing death of the tissue of which the cells are a part.

While dechlorination, alkalosis, and dehydration are the most important physiological alterations incident to distention of the bowel, there are, undoubtedly, in addition, other significant changes in the electrolyte pattern, as well as alteration in the non-protein nitrogen, fibrin, and urea levels in the blood (26, 14). The origin of the increase in the blood fibrinogen observed in acute obstruction is obscure beyond the fact that such increase does occasionally occur. Part of the increase may be attributed to the hemoconcentration due to dehydration. It is also plausible that the liver, the probable site of fibrinogen formation, may be stimulated in some obscure way to increase its production of this substance and liberate it into the blood. The reason for increase in the urea content of the blood is also vague, but it seems reasonable to assume that such an increase may be accounted for, at least in part, by an increased rate of tissue destruction in conjunction with some form of impairment of the excretory process.

While these changes are much in evidence in the later stages of acute obstruction when the distention has been present for some time and has involved progressively more of the intestinal segments proximal to the obstruction, they do not account for the severe shock-like syndrome frequently found when the onset of the obstruction is acute, such as is encountered in sudden mechanical occlusion of the lumen of a bowel segment or severe interference with its blood supply. The clinical manifestations observed in these instances are remarkably similar if not identical with those of shock. Considerable experimental evidence indicates that these effects are reflex in character and originate from the abnormal stimulation of visceral afferent fibers from the affected portion of the intestine. That distention alone plays a significant part in the production of these reflex manifestations is entirely probable, since distention of the gut in otherwise normal experimental animals elicits reflex responses in respiration, blood pressure, and heart rate, ranging in intensity with the rapidity and degree of the distention induced (8). The rapidity of onset of distention is in some measure dependent upon the specific cause of the obstruction. When the in-

testinal lumen is suddenly and completely occluded by some mechanical factor such as occurs when the bowel slips beneath a constricting band distention with its train of consequent disturbances quickly ensues. When the obstruction is caused more gradually as by a slowly growing neoplasm which protrudes in or impinges on the intestinal lumen the onset of the distention is slower and far better tolerated. Besides determination of the rate of onset of distention and its degree major consideration must be given to the specific cause involved in any particular instance of obstruction because it may determine the status of the circulation to the obstructed segment.

From the foregoing considerations it is apparent that therapeutic measures in acute obstruction are to be directed toward two general objectives: (1) correction of the local and systemic pathological disturbances which the obstruction has created and (2) restoration of the normal bowel function by removal of its cause.

Correction of the local and systemic disturbances incident to obstruction should be begun as soon as the diagnosis of obstruction is made. The procedure consists in the restoration of the normal fluid and electrolytic balance by the administration of adequate quantities of water and sodium chloride and the elimination of the distention incident to the stasis or obstruction by decompression of the obstructed bowel. The administration of normal saline solution is indicated both prophylactically and therapeutically in the former case to ameliorate the dehydration and chloride loss as it occurs and in the latter to restore the fluid and salt depletion already extant. The amount of saline solution to be administered is therefore dependent on the condition of the patient and will vary with the severity of the obstruction and its duration prior to treatment. A fairly dependable method for determining the amount of fluid and salt to be given intravenously has been devised; it is based upon the determination of the blood chlorides (6, 7, 31). Usually the appraisal of the obstructed patient cannot wait for such a time-consuming procedure and external signs such as texture of the skin, appearance of the mucous membranes and concentration of the urine must serve to indicate the amount of fluid and salt necessary. The amount of urine excreted in the presence of normal renal function affords a simple method of determining the quantity of fluid essential to maintain adequate hydration. Regardless of the replacement of fluid and salt (38, 39) life is not maintained over long periods if acute distention of the small bowel

is unrelieved (2, 15). Accordingly decompression in conjunction with fluid and salt administration is equally essential. As with fluid and salt administration decompression is both a prophylactic and therapeutic measure in that it prevents distention in early cases and relieves it in the late (37, 1, 20, 21, 22). Decompression may be accomplished by intubation or by enterostomy.

Decompression by intestinal intubation is now a familiar subject in clinical and experimental literature. Little needs be added in discussion of the technique except to reiterate certain points in connection with the manner in which the decompression is effected. The process of intubation consists essentially of the introduction of a double tube or a double lumen tube into the stomach through the pylorus and into the small intestine. At the end of the tube is a perforated metal tip a few inches proximal to which is an inflatable rubber balloon. There are numerous perforations in the space of tube between the tip and the balloon and above. When the tip of the tube is well past the pylorus so that the balloon also lies in the duodenum the balloon is inflated and continuous suction applied. Such inflation causes pressure on the walls of the intestine which serves as a stimulus to peristalsis and at the same time as an object of sufficient bulk and diameter for the increased peristaltic activity to propel along the lumen. The tube therefore progresses within the lumen as long as the latter is sufficiently patent to allow its passage and there is adequate peristaltic activity to carry it. As the tube progresses the suction applied to the external end creates a constant negative pressure within the tube which causes the intestinal content, gas, fluid and particulate matter to pass into the holes in the tube provided for the purpose. The intestinal content is thus drawn from the lumen of the bowel into the tube and thence to the outside the process being a continuous one. As the tube with draws the accumulation of static intestinal content from each successive loop of intestine the distention within that segment due to gas and fluid is reduced. Reduction of the distention allows in a large measure the resumption of peristaltic function within the decompressed segment so that it becomes ultimately adequate to carry the tube farther to the next distended loop in which the process is repeated. In this way segment after segment of the distended bowel proximal to the obstruction is progressively decompressed, resumes peristaltic function and propels the tube onward. If the obstruction is caused by an occlusion of the lumen the tube progresses to the point of occlusion where further

progress is impossible and it remains there. Until the cause of the occlusion is removed, the tube continues to drain the constantly recurring accumulation of fluid and gas at the site of the obstruction and in the reaches of the bowel above it. The distention so reduced is in this way prevented from recurrence. If the obstruction is not caused by mechanical occlusion of the lumen, but by failure of peristalsis also, such as is commonly encountered in postoperative adynamic ileus, the mechanism of decompression is much the same. The tube is passed by the yet active bowel to the inactive segment where there is insufficient peristalsis to carry it farther. At this point it withdraws the accumulated gas and fluid in the proximal portion of the inactive segment, and prevents further accumulation within the latter. Reduction of the distention and prevention of its recurrence eliminates its mechanical effects on the walls of the inactive portion of the bowel and promotes a more rapid return to normal peristaltic function. When this occurs the tube is carried farther into the inactive segment, decompressing as it progresses, until such time as the inactive bowel is completely relieved and returns to adequate peristaltic function.

Much has been said concerning enterostomy in cases of intestinal obstruction. Before the use of decompression by intubation this was the only available form of direct decompression short of correction of the cause of the obstruction. Difficulties associated with the indiscriminate use of this method of decompression caused many to condemn its use. The objections which have been raised concerning this operation center about the fact that (1) it does not correct the cause of the obstruction, (2) it produces an intestinal fistula, (3) it drains but a single loop of bowel in the case of adynamic ileus, and (4) it may exaggerate the cause of the ileus either because of the trauma of the operation or by causing additional adhesions. Even in the face of these facts there remains an occasional case of mechanical obstruction in which enterostomy is justified. In the presence of adynamic ileus there is no justification for enterostomy since it drains but one loop and nearly always increases the amount of ileus present.

From the standpoint of simple mechanics, an enterostomy performed above the point of obstruction permits decompression at the ideal site, and compares favorably with long tube suction so far as emptying of the bowel content is concerned. There is, however, much greater loss of fluids and salt from an enterostomy than from suction drainage applied at the same point. A possible

explanation of this is that there is more stimulation to activity of the gut in the case of enterostomy than in tube drainage and that the tube drains only when fluid or gas passes the openings in the tube, and this only partially because of the rapidity of propulsion past the drainage site. It is obvious that enterostomy for obstruction of the small bowel is a procedure to be used rarely, and then only after careful consideration of the deficiencies of the method as well as its advantages.

The optimal time for attempting the second therapeutic objective restoration of the normal bowel function by removal of the cause of the obstruction, depends upon the condition of the patient and the type of the obstruction. The therapeutic objective of removal of the cause of the obstruction involves the decision as to whether or not the cause can be relieved by surgical intervention, and if such is the case, at what time the surgical procedure is to be attempted. It is obvious that no case is to be subjected to surgery when shock, dehydration or other concomitants of obstruction of a sufficient degree to jeopardize recovery are present. Therefore it is absolutely essential in all cases considered surgical, even when the indication for surgery is most immediate, to improve the patient's general condition to the point where operation can be withstood, before it is attempted. This is accomplished by the standard methods of blood transfusion, intravenous infusion, the application of heat, and administration of indicated drugs. The most urgent consideration concerned in the question of immediate or delayed surgery is whether or not the blood supply to the obstructed bowel segment is intact.

Circulatory embarrassment may occur simultaneously with the obstruction as when the bowel and a part of its mesentery are mechanically compressed by a constricting band or stricture. It may ensue subsequent to the obstruction, or it may itself be the primary cause of the obstruction, as in mesenteric thrombosis. Distention of the bowel incident to simple obstruction if prolonged and of a marked degree undoubtedly produces circulatory changes of a deleterious nature in the distended area of the intestine. The most important circulatory effects are, however, concerned with the mesenteric vessels. Compression, hemorrhage, thrombosis, or embolism of the mesenteric radicals deprives the area of the bowel supplied by the affected vessels of their blood supply with consequent loss of viability and ultimate necrosis. The inevitable results of the circulatory embarrassment are tissue anoxia, loss of viability, and necrosis, with consequent passage

of the toxic intestinal content into the peritoneal cavity. Few stronger indications for prompt surgical intervention exist than acute intestinal obstruction complicated by a co-existing circulatory embarrassment. Once the diagnosis of mesenteric circulatory interference to the obstructed segment is made, early laparotomy is imperative. To temporize is to court the disaster of peritonitis. In general, the surgical procedure of election depends upon conditions obtaining at the time of operation. If the bowel is viable the cause of its impaired circulation is removed if possible and the segments are returned to the abdomen with simple closure. If the bowel is no longer viable, resection of the necrosed portion with subsequent anastomosis is obligatory.

When it is apparent that the cause of the obstruction can be relieved by surgery but no embarrassment of the circulation of the obstructed portion exists, considerably more latitude in treatment can be allowed. The therapeutic effort is then best directed primarily toward the objective of relieving the local and systemic pathological effects of the obstruction and delaying any contemplated surgical attack on the cause of the obstruction until the most opportune time. In brief, in cases of obstruction presenting no circulatory embarrassment of the bowel which are properly treated by decompression and the administration of fluid and salt, surgical relief of the cause can be made practically an elective procedure.

When the cause of the obstruction cannot be relieved by surgery as in obstruction caused by peristaltic failure alone, the entire therapeutic effort must be directed toward the therapeutic objective of relief of the pathological effects of the obstruction by decompression and the administration of fluid and salt in order to create conditions most favorable for the return of normal bowel functions.

SUMMARY

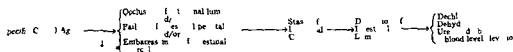
Acute obstruction of the small intestine is essentially a condition of stasis of intestinal content of such duration and degree that it produces general as well as local pathological changes whatever the specific cause. Such stasis of intestinal content can be produced only by any one, two or all of three factors, namely, occlusion of the intestinal lumen, failure of propulsive peristalsis

and embarrassment of the mesenteric circulation. The inevitable result of obstruction is distention of the obstructed segment from the accumulation of fluid and gas within the bowel. Distention is the chief causal factor of the occurrence of dehydration and dechlorination and a probable agent in the production of the shocklike syndrome frequently encountered. Correlation of the above factors may be illustrated by the schema shown at bottom of page.

The treatment of acute obstruction of the small intestine should be directed toward two therapeutic objectives—the relief of the local and general pathological disturbances created by the obstruction and the removal of the cause. The first objective is accomplished by supplying fluid and sodium chloride in conjunction with decompression. Decompression is best accomplished in the great majority of cases by intestinal intubation and only in very rare instances by enterostomy. The second therapeutic objective, the removal of the cause, may or may not be amenable to surgical intervention. If it can be relieved surgically, the question as to when the surgical procedure is to be carried out depends on whether or not the blood supply to the obstructed bowel is embarrassed. In instances where such circulatory embarrassment exists, immediate operation is indicated as soon as the patient's condition can be improved to present a reasonable chance of withstanding the operative procedure. Cases diagnosed early before dangerous distention, dehydration and dechlorination have occurred can be operated upon with little or no preliminary decompression or hydration. In instances in which the cause is amenable to surgery but no circulatory embarrassment exists, surgical removal can be delayed almost indefinitely and made an elective procedure with proper decompression and maintenance of the fluid and electrolytic balance. In instances of obstruction in which the cause is not amenable to surgical removal, e.g., patent inoperative obstruction, expectant treatment by decompression and maintenance of the fluid and electrolytic balance is to be carried out while awaiting the return of normal bowel function.

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ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

HEAD

Lyons C. The Treatment of Staphylococcal Cavernous Sinus Thrombophlebitis with Heparin and Chemotherapy (*Surg* 1941; 13: 13)

The author reports the survival of 2 consecutive patients with bacteremic staphylococcal cavernous sinus thrombophlebitis treated with a combination of chemotherapy and heparin. Both patients entered the hospital with this condition subsequent to nasal furuncles of five and seven days duration. Heparin was administered at once in sufficient amount to maintain the clotting time of the blood at ninety minutes which level was maintained for eighteen days or until repeated blood cultures were negative. Sulfapyridine was chosen to start the treatment since it diffuses into the spinal fluid more effectively than sulfathiazol. The latter drug was then substituted since it seemed to be the drug of choice for this type of infection. The blood level of both drugs was maintained at 5 mgm. per cent for prolonged periods of time despite apparent clinical improvement and the cessation of the bacteremia. Omission of the sulfapyridine in the first case after apparent recovery was followed by the development of a chronic staphylococcal meningitis which required the administration of sulfathiazol for a period of four months. In the second case treated with constant prolonged chemotherapy (sulfapyridine followed by sulfathiazol) no meningitis developed. Cranial nerve palsies demonstrable during the height of the disease cleared remarkably during convalescence.

STA. LEV. ROB. 1: 8 MD

EYE

Paez Allende F. The Surgical Removal of the Crystalline Lens without Iridectomy (Etiología quirúrgica del cristalino sin iridectomía) (*Smao* 1940; 43: 249)

The author has operated upon 15 cases of senile cataract in one year using Dimitry's suction cup; some and in others the capsular forceps of Green or Arruga or he has used the method of extracapsular extraction with lavage of the anterior chamber with physiological serum. He has always left the iris intact and at the frequently mentioned and greatly feared hernia of the iris has never occurred. Now a lavage this accident is avoided by the actual surgical procedures and the use of preventive measures prolonged immobilization of the eyelid, suture of the edges of the wound, solid protection against any traumatic removal of all soft masses of the lens by total extraction and lavage better and complete clinical study of the cases and operation in bed to

avoid the dangers of transfer for the patient. There has been no case of postoperative hemorrhage in the anterior chamber and vision is good in all patients. Slight pupillary decentration has occurred in only a few cases and no loss of vitreous substance has been observed.

The method has included a purgative on the eve of the intervention and a coagulant some hours before or pre-operative autotomy ray. Complete anesthesia of the orbicular muscle of the eyelid preferably prolonged for several days by the addition of 0.5 c.c.m. of alcohol to 6 or 7 c.c.m. of 2 per cent novocaine solution without adrenaline; produced which is followed by hypotonic retro-ocular anesthesia external canthotomy, and repeated cocaine instillations. Cocaine-euphthalmin is given one hour previously and adrenaline is injected under the conjunctiva to obtain lasting mydriasis. A classical incision which gives a short scleroconjunctival flap is used and extraction of the lens performed; suture is done with the finest possible silk. One per cent eserine in oil is administered and palpebral occlusion is obtained by pulling the upper eyelid down by means of a suture previously inserted in its border for traction purposes during the operation.

The term iridectomy is inappropriate because the iris is never excised completely; partial iridectomy would be more to the point. However this procedure should be banished from the cataract operation because prolapse of the iris does not occur if the previously mentioned measures have been taken. The intact iris offers great advantages such as the preservation of the sphincter, clear images and less danger of hemorrhage.

Hernia of the iris used to occur in extracapsular extraction in which remnants of lens were left behind, they acted as foreign bodies and tended to be used from the eye pulling with them the iris which prolapsed between the edges of the wound that were simply coated but not sutured; these edges were easily everted their raw surface acting in a reflex manner to cause movements or violent contractions of the occluding muscle of the eyelid and the force transmitted posteriorly tended to push the iris outward. All this is avoided by the present method and the use of a solid protector which eliminates possible involuntary blows on the eye is another factor which prevents hernia of the iris. In addition the transfer of the patient from the operating table to the wheeled stretcher for transport and transfer from the stretcher to the bed are other factors in the occurrence of hernia of the iris. The eserine is tilted at the end of the operation contracts the pupil and helps to eliminate the possibility of its prolapse. The opinions of various well known authors

SURGERY OF THE HEAD AND NECK

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In this scholarly article which, when presented
anonymously, was awarded the Lucien Howe Prize
in 1940, the author attempts to prove that acute
retrobulbar neuritis is an acute vascular catastrophe
in the optic nerve or chiasm which can have many
causes According to his theory the immediate ef-
fect is acute localized tissue anoxia and loss of func-
tion The changes in the arterioles and capillaries
are the final common routes through which different
etiological agents produce the same clinical and
pathological picture The pathological picture is
similar to that of shock and histamine poisoning
Excessive arteriolar constriction (spasm) leads to
increased capillary dilatation and permeability and
results in localized edema, tissue anoxia, and loss of
function in the involved tissue

The probable correctness of this premise is sub-
stantiated by the clinical cases reported In 65 eyes
with retrobulbar neuritis which were treated by
standard methods, 63 per cent had a final vision of
from total blindness to 20/100, and 21 per cent had a
final vision of from 20/30 to 20/20, 10 eyes were
unchanged or became worse with treatment, and
23 eyes had optic atrophy It was found that there
was no great tendency for the eyes to improve spon-
taneously and that nasal sinus surgery was non-
specific in its action

Twenty-nine patients were treated with vaso-
dilators on the basis of the theory here enumerated
No other treatment was employed in these cases
None of the eyes became worse under treatment
Before treatment, 17 eyes had vision of from hand
movements to 20/100, after treatment 25 eyes (86 2
per cent) had vision of from 20/30 to 20/15 Of the
4 eyes with final vision of less than 20/200, 2 were
seen sixty days after onset of the condition, and 2
did not have further treatment For the 25 im-
proved eyes, the average duration of loss of sight
was sixteen days and the average time required for
the attainment of their best final vision was nine
and seven-tenths days, as compared to thirty-four
and three-tenths days in the cases not treated by
vasodilators

Papilledema and multiple sclerosis were not of
unfavorable prognostic significance The earlier the
treatment was begun, the better were the visual
results There was believed to be no necessity for
operating on sinuses or other foci of infection unless
the local condition of the focus required it *per se*,
the retrobulbar neuritis was not considered an indi-
cation for operation None of the author's patients
was hospitalized for the treatment While intra-
venous administration of sodium nitrite, and inha-
lational administration of acetylcholine, and inha-
lations of amyl nitrite were all found to be of value, the

author believes that the intravenous use of sodium
nitrite is most effective WILLIAM A. MANN, M D

Dandy, W E Results Following the Transcranial
Operative Attack on Orbital Tumors Arch
Ophth, 1941, 25 191

A series of 24 intra-orbital tumors that have been
operated on by the transcranial route is reported
Five, or 21 per cent, of these tumors were confined
to the orbit, while 18, or 79 per cent, were combined
intra-orbital and intracranial growths, 1 of the for-
mer and 2 of the latter were metastatic With an
additional 7 cases, in which autopsy was performed
but this operation had not been employed, the per-
centages were even more pronounced, 16 2/3 per cent
and 83 1/3 per cent, respectively The pathological
features of the tumors are discussed

The operative attack, proposed in 1921, is through
a transcranial (hypophyseal) approach The roof of
the orbit is removed after evacuation in the cisterna
chiasmatis, retraction of the frontal lobe then pro-
vides sufficient room

The operation is offered not only for all combined
intra-orbital and intracranial tumors but for growths
that are restricted to the orbital cavity As a matter
of fact, it is rarely possible before operation to be
certain whether or not the tumor also lies within
the cranial chamber, as so many of them do (roughly
75 to 80 per cent in this series) This condition
should therefore be assumed on the law of prob-
ability

For tumors confined to the orbit this operation
offers a far better exposure than is possible by any
other approach There is, therefore, much less chance
of injury to the extra-ocular muscles, their nerve
supply, the optic nerve, and the ophthalmic vessels
by this approach

It offers the only hope of a permanent cure when
the tumor is in both cavities, and when the condition
is incurable it offers the maximum palliative result

The operative risk in safe hands should be very
low (4 1 per cent in this series) in regard to both
tumors confined to the orbit and those with intra-
cranial extensions Prior exenteration of the orbit
or removal of the eyeball will prevent the utilization
of this operation, because the orbital tissues will be
infected

LESLIE L. MCCOY, M D

EAR

Lillie, H I The Diagnostic Significance of Partial
Paralysis of the Facial Nerve in Chronic Sup-
purative Otitis Media and Mastoiditis Ann
Otol, Rhinol & Laryngol, 1941, 50 38

Partial paralysis of the facial nerve invariably has
been looked upon as being caused by an intracranial
lesion which involves the nuclei When such paral-
ysis occurs in the absence of chronic suppurative
otitis media, there is little doubt about the situation
of the lesion However, only a few references have
been found in the literature to suggest that when
partial paralysis of the facial nerve occurs in the

presence of chronic suppurative otitis media the lesion involves a certain portion of the nerve trunk within the temporal bone.

The situation of a lesion causing facial paralysis may be determined accurately anywhere in the course of the pathway of the nerve from the lower end of the precentral cortical gyrus to the innervation of the peripheral muscle when disease of the middle ear is not present. Cerebral lesions because they cause the upper neuron type of paralysis spare the occipitofrontalis orbicularis palpebrarum and corrugator supercilii muscles. Lesions in the upper part of the pons would be accompanied by involvement of the pyramidal tract on the same side. A lesion in the lower part of the pons should produce involvement of the opposite side. If the lesion is in the medulla the eye on the same side should turn inward from involvement of the sixth (abducent) nerve and there should be an accompanying effect on the pyramid and fillet. Lesions proximal to the geniculate ganglion usually cause impairment of hearing and equilibrium. Involvement of the geniculate ganglion (Ramsay Hunt syndrome) is manifested by herpes of the external auditory canal and the adjacent auricle. If the lesion is situated distal to the geniculate ganglion the resulting paralysis is of the lower neuron or flaccid type and involves all of the facial muscles. All are familiar with the typical clinical picture of facial paralysis. If sensations of taste are absent from the anterior two-thirds portion of the tongue the lesion is situated between the geniculate ganglion and the point at which the chorda tympani leaves the nerve trunk to pass through the middle ear. Involvement of the branch innervating the stapedius muscle or the chorda tympani is not always easy to determine in chronic suppurative otitis media.

It is apparent that for the patient to have the aforementioned syndromes the entire trunk must be affected by the lesion. That complete involvement of the nerve trunk is not always present in peripheral lesions causing partial paralysis has been clinically observed.

Whether partial facial paralysis is encountered pre-operatively or post-operatively in a given case the portion of the face involved may provide the information necessary to determine the type of the lesion.

Of most importance to otologists in the study of pathological factors are the anatomical relationships of the facial nerve within the middle ear. The aural surgeon seems to be concerned with injury of the nerve below the level of the horizontal canal more often than he is with the proximity of the middle ear. Pathologic lesions are more likely to affect the facial nerve under the anterior end of the promontory of the horizontal canal and near the eminentia pyramidalis. Necrosis of the bone in this region and resorption of the bone caused by the insidious destructive effect of cholesteatoma are the two main pathological causes of involvement of the facial nerve.

The clinical evidence presented seems to show that partial facial paralysis occurring before or soon after operation on the ear has diagnostic significance in the location of the part of the nerve trunk involved. The institution of early operative relief for the compressed or injured nerve seems to be a rational method of treatment. Partial facial paralysis occurring in the presence of chronic suppurative otitis does not necessarily mean that the lesion causing the paralysis is situated in the intracranial nuclei.

William W. Otogenous Meningitis 411
 & New England J. Surg. 94: 10-249

Williams investigated a series of 40 cases of diffuse leptomeningitis of otitic origin which occurred at the Victorian Eye and Ear Hospital during the past five years. Of the 40 patients 36 died and 4 recovered. The sexes were represented by 28 males and 12 females. In 28 cases that is in almost three-quarters of the total meningitis followed acute otitis the average age of the patient being twenty to 30 years. In 10 cases the otitis was chronic in the remaining 2 cases it was of a few months duration and might be termed subacute.

In this series the focus of infection was extralabyrinthine in 36 cases and labyrinthine in only 4. There was evidence that in the extralabyrinthine group there were at least 5 cases of petrositis of cerebellar abscess 2 of cerebellar abscess and 3 of sinus thrombosis. Streptococci were present in 14 cases and pneumococci in 5. In all 4 cases in which recovery occurred the streptococcus was the infecting organism.

In 31 cases Schwartz mastoid operation was the first procedure and in other 9 radical mastoidectomy was the operation chosen. Further exploration was frequently found necessary. In the great majority of cases the exposed dura and sinus appeared normal. The labyrinth was drained in 7 instances the jugular vein ligated three times and Danley's cysternal drainage operation was performed once.

Medical treatment apart from the administration of free fluids and the occasional use of hypotonic saline solutions and cataplasms consisted mainly in the administration of antistreptococcal serum and lumbar puncture. 3 of the 40 patients received serum Sulfanilamide or an all drug was used in 4 of the latter category. The results of these procedures occurred.

N. D. FABRICA T. M. D.

NOSE AND SINUSES

Teed R. W. Primary Osteoma of the Frontal Sinus 14011 Y. G. 94: 33-55

Two cases of osteoma primary in the frontal sinus are reported several resting histologically as reviewed and a report of one of the first illustrations of a patient who had had osteoma is shown. A survey of the literature reveals 332 cases a figure which indicates that osteoma while not common is certainly not rare. About 40 per cent of all osteomas of the accessory sinuses originate in the frontal

sinus The disease is essentially one of youth, by far the greatest incidence occurring in the second and third decades. It attacks males more frequently than females. The various theories as to its causes are reviewed, the conclusion being reached that no completely satisfactory explanation has as yet been devised. The pathology is reviewed briefly, four main types of osteoma being described.

In connection with the diagnosis of osteoma it is pointed out that the first case to be recognized by roentgen examination was reported by Coppez in 1899. The complications caused by the growth of the neoplasm into the nasofrontal duct, the neighboring sinuses, the orbit, and the cranial cavity are discussed as illustrative of Gerber's statement that osteomas are benign histologically but malignant clinically. Treatment is then discussed, and statistics are shown, which indicate that in the pre-antiseptic era the surgical mortality was 31.2 per cent, while since 1875 it has been only 3.7 per cent. The opinion is expressed that operation should be carried out while the tumor is small, rather than after the appearance of symptoms of extrasinusal extension. If infection is present, the resort to surgery should be delayed until the infection is quiescent.

JOHN F. DELPH, M.D.

Arons, I. Neoplasms of the Antrum, Nasopharynx, and Hard Palate. *Laryngoscope*, 1941, 51: 61.

The nasal passages and their accessory sinuses, including the hard palate, are the seat of a series of neoplastic formations, benign and malignant. The frequency of these tumors is great, since this region is so often afflicted by inflammatory or irritating processes which might form the basis of tumor growth. Before a decision regarding treatment is made, the clinical diagnosis should be confirmed by pathological differentiation, whenever and wherever it is possible, since successful treatment depends on accurate identification of the tumor.

Taking into consideration the magnitude of material, the author limits his discussion briefly to neoplasms of the antrum, the nasopharynx, and the hard palate. These three regions present to the radiotherapist a similar problem, since all of the conditions which are found are treated primarily by external irradiation. The portals are usually of limited dimensions and, on the whole, the resultant complications within the course of treatment are of a similar nature.

Since the pathological differentiation of tumor growth in the antrum has become more precise, the means of treating this condition are, consequently, more accurately defined. Radical surgery, with its unfortunate consequence of mutilation, should be considered only if the condition does not permit any other method. The treatment of choice is a combination of surgery and irradiation. Nasopharyngeal tumors present to the physician the problem of diagnostic differentiation, and they are quite frequently not properly diagnosed until in an advanced stage. Because of their radiosensitivity the proper method

of treatment is external irradiation and contact radium application.

A fibroma of the nasopharynx should be treated only conservatively, to relieve the pressure symptoms, as these growths tend to regress spontaneously with the completion of skeletal developments. Pathological differentiation of growths of the hard palate will determine the method of treatment procedure. If the tumor is of mixed cell origin and encapsulated, excision is the best method. If the tumor is malignant, and is still operable, pre-operative irradiation, excision, and postoperative irradiation is the method of choice. If the tumor is inoperable, irradiation both by x-rays and radium must be carried out.

NOAH D. FABRICANT, M.D.

MOUTH

Kazanjan, V. H. The Interrelation of Dentistry and Surgery in the Treatment of Deformities of the Face and Jaws. *Am. J. Orthodont. & Oral Surg.*, 1941, 27: 10.

The successful treatment of face and jaw injuries requires the intelligent co-ordination of dental and surgical procedures. During the World War the development of surgical prosthesis proved of great benefit to correction of war mutilations.

Mandibular prognathism may be due to hereditary causes, trauma, or disease. It may be treated surgically in carefully selected cases by removing a section of the bone from each side of the body of the mandible or by cutting through the ramus and pushing the jaw back to a desirable position where it is immobilized. Twenty cases have been operated on—patients from fourteen to twenty-six years old with an average hospitalization period of fourteen days. A marked improvement of facial contour resulted in all cases as well as improved function. An opening of the bite is more likely to follow the ramus operation, but it is a simpler operative procedure.

In retrusion of the mandible an L-shaped or diagonal cut through the body of the mandible permits a lengthening of the jaw while contact is retained. The jaw is fixed in its new position by intermaxillary wiring or splints for about two months. Bone grafts anterior to the chin may also be of help.

Secondary deformities of cases of cleft palate are amenable to surgery, but dental and orthodontic treatment will often be employed beneficially.

Five interesting case reports illustrate the procedures described.

CHARLES W. FREEMAN, D.D.S.

Thoma, K. H. The Use of Radiopaque Diagnostic Media in the Roentgen Diagnosis of Oral Surgical Conditions. *Am. J. Orthodont. & Oral Surg.*, 1941, 27: 64.

The author illustrates from experience with a series of representative cases the additional aid that can be secured in oral surgical diagnosis by the use of lipiodol and iodochloral. He describes the physical characteristics of these two substances, each of which is iodine combined chemically with oil for radiopacity.



Fig. 1. Iodochloral sialogram of the parotid duct showing a stricture at the distal end.

Forty years ago lipiodol was used therapeutically and only recently has its diagnostic value been realized. It is non irritating to the tissues and is contra indicated only in the presence of an iodine sensitivity to iodides in acute active tuberculosis and in debilitated patients. A brief summary of the widespread uses of lipiodol in general roentgen diagnosis is given.

Iodochloral, a recent American product is cheaper, more stable than lipiodol and can be heated in an autoclave without decomposition. The tissues in contact with it are not irritated because of the firm character of the organic linkage between the oil and the halogens. The therapeutic usefulness of iodochloral as a lipiodol depends probably on its mechanical action in displacing mucopurulent secretions in infected cavities.

The essential instrument necessary for the use of these substances are a syringe and suitable needles and cannulae. A sharp needle is preferable for injecting cysts and nasal sinuses as it can be forced through the thin bony wall and it will cut through the lining membrane without separating the membrane from the bone. When fluid is to be aspirated from a cyst a syringe with detachable needle is preferable as this eliminates the need for repeated withdrawal of the needle. For the injection of the ducts of the salivary glands a blunt cannula is required. For use in the submaxillary duct a curved cannula is chosen for the parotid duct a straight or curved cannula may be used.

The author presents roentgenograms and photographs of several cases in which the x-ray diagnosis was aided by the use of radiopaque substances. In each case a detailed description of the technique of injection is given. Thus the origin of fistula of the face from bone tooth or soft tissue is traced the solid or cystic character of the tumor of the jaw is determined the different antrum of the maxilla from the nasal cavity and various pathological conditions in the paranasal sinuses are visualized. Often the information thus gained is useful for the planning of the operative procedure.

Sialography which is x-ray study of the salivary gland by means of radiopaque substances injected into the ducts is useful in detecting causes of inflammation in these glands as well as in outlining cysts or tumors in them. As the interpretation of sialograph requires accurate knowledge of the anatomy of these glands the author describes and presents illustrative drawings of the anatomical relationship and normal variations of the parotid submaxillary and sublingual glands.

Several cases of lesions of the salivary gland are presented and a detailed description of the technique of injection by means of a fine blunt cannula is given.

Figure 1 is a sialograph of a patient who complained of a swelling behind the jaw at mealtime. A stricture can be seen in the parotid duct with dilatation of the ducts behind it.

BRADFORD CALHOUN, M.D.

Brown, J. B. and Byar, L. T. Malignant Melanoma. *J. Othol. & Otol.* 1941, 27, 90.

The authors re-emphasize the rapidly fatal character of malignant melanoma, the uncertainty of its origin and the diversity of its occurrence. Because of certain confusion regarding treatment they present some guiding principles of such treatment. Since a large percentage of such malignancies arise in pigmented nevus destruction of the pre-existence of nevus should be the goal. They recognize two types of nevus: (1) the congenital or nevocarcinoma which is flat and not heavily pigmented and seldom becomes malignant and (2) the nevus that develops any time during life increases in size and often becomes malignant. They state that any pigmented or non-pigmented moles subjected to chronic irritation or showing evidence of growth increase in vascularity, change of color, repeated infection or of ulceration and all smooth, coal black nevi should be removed. The danger of fooling with the common mole with acids or incomplete electrode excitation are stressed. The removal should be quick, painless, non-irritating, thorough and with minimum handling of the growth. A method which fulfills these requirements is described by the authors (Fig. 1).

The diagnosis of the change from an innocent pigmented nevus to a malignancy is made on the basis of an increase in elevation or surface area, deepening of pigmentation, an increase in vascularity or an apparent chronic infection. An entirely new wart-like growth on the skin or under the nail may be difficult to diagnose as a melanoma but such neoplasms should be considered malignant. Melanoma may or may not be present in these melanomas.

There is general agreement that malignant melanoma is resistant to radiation. The treatment of choice in melanoma of the face and head is surgical and the operative removal usually with a cautery or diathermy must be quick with a minimum handling of the lesion and should include a generous margin of surrounding normal skin and a subcutaneous tissue down to the fascia. This excision may require later repair with skin grafts or pedicle flaps.

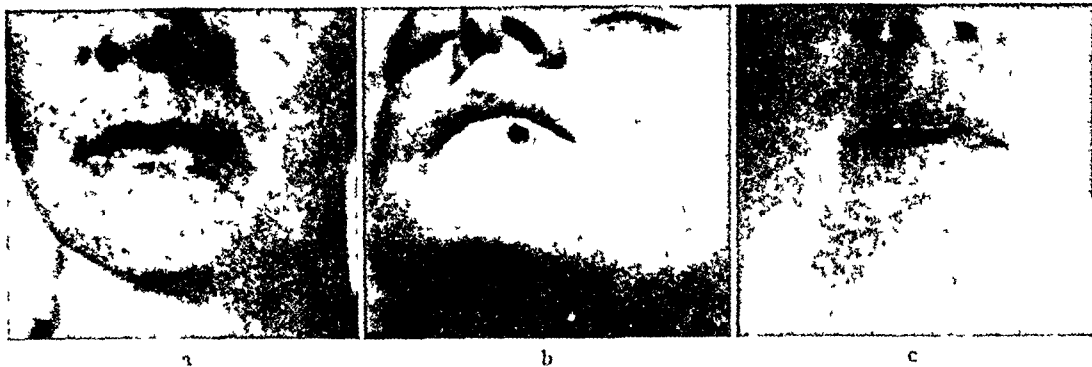


Fig 1 a Illustration of an ugly slowly growing mole of the lip b The site of the mole after cauterization

c The final healing result with the practically invisible scar

The usual cause of death in cases of malignant melanoma is rapidly occurring metastases rather than extension from the local lesion. Five possible causes exist:

- 1 There may be recurrence of the initial lesion
- 2 Metastasis may occur in the adjacent skin
- 3 There may be generalized rapidly fatal skin metastases which possibly have their origin in the pituitary-melanophore relationship
- 4 Visceral metastasis may occur in a matter of months or years even with the local lesion cured. The patients with late metastasis seem to have the original lesion in the chorioid of the eye
- 5 There may be local lymph-node metastasis. Only in this last group is there hope of cure.

Therefore, if the primary lesion is located so that its lymph drainage is fairly well predictable, a prophylactic dissection should be done.

The authors present 11 advanced cases of malignant melanoma, among them was a case with seven-year cure following radical neck dissection for metastatic melanocarcinoma, and a case of primary melanoma of the parotid gland with secondary skin metastasis in which the patient was alive and well four years after radical removal. In a third case, a melanocarcinoma of the cheek with neck metastasis, which necessitated excision and grafting of the initial lesion, radical neck dissection, and subsequent removal of a parotid metastasis, the patient was alive after fifteen months.

BRADFORD CANNON, M D

NECK

Haldre, J. Contributions on the Roentgen Therapy of Malignant Strumas Treated or Not Treated by Operation (Beitrag zur Roentgentherapie der operierten und unoperierten Struma maligna) *Roentgenpraxis*, 1939, 11: 615

Malignant struma is rare. The frequency at the Institute varies between 0.09 and 1.04 per cent. In goiter-free regions it is more common. At the Central Roentgenological Institute in Tartu (Dorpat) there were a large number of cases over a period of

eleven years, 34 cases being observed. The age of the patients varied between twenty and seventy-eight years. Others have observed patients under twenty years of age, the youngest being seventeen. The majority of cases seem to occur in patients over fifty years of age, however statistics vary. Portmann believes that only the clinical condition is conclusive evidence of this disease, histological diagnosis may be erroneous. The author reports a case of apparent Basedow goiter which was treated by partial excision and showed malignancy upon histological examination. This was confirmed by early metastases. Histological examination is necessary to determine the type of tumor.

Thyroid sarcoma, which is very rare, has a poor prognosis. According to Walter, who observed 28 cases, irradiation alone gave better results than operation while operation followed by irradiation never produced freedom from symptoms. The Holfelder Institute had even better results in 37 cases, 1 patient lived three years, and another four years. It would seem that the Holfelder technique of gradually decreasing the doses and using a standardized procedure is superior.

The author's cases are remarkable in that mostly women were affected, which corresponds with the condition in Estonia where goiter is infrequent. In 24 cases the diagnosis was made histologically, in 10 of these the same diagnosis had been made clinically. No patient was sent away on account of far advanced findings. Operated cases were irradiated postoperatively, and 10 cases had roentgen therapy only. Since 1930 fractional irradiation has always been used. Telangiectasis occurred very seldom. Before 1930 intensive irradiation consisted of 170 kV through 0.5 mm of copper filter and 25 r/min of flow. After this treatment there always was pigmentation and telangiectasis. The treated cases which were already hopeless on admission invariably terminated fatally within a few months. Twelve of the 34 patients died, 7 in the first year. Among the 15 operated cases the prognosis is very good. Only 1 patient died two years after operation because of a

lung metastasis. The patients received on the average two irradiations as after treatment with an interval of six weeks. There was a total of 13 cases with three year cures 12 of the patients having lived three years or longer. The prognosis of the cases not treated surgically was less optimistic. Of 10 patients only 4 are living. These patients were all given large doses of irradiation until satisfactory results were obtained. At first the condition always became worse but in ten days this was overcome. The authors protect the irradiated skin with a cloth impregnated with paraffin oil. Of the 4 living patients 3 have been followed up for two years and 1 for seven years. The irradiation pain have subsided and the general condition is good.

The prognosis was considerably better in the operated cases in which inoperability was found at the time of operation. Of 8 patients only 4 died. The survivors 2 of whom have been observed for two years and 1 for three years are completely symptom free. These patients received at least two irradiations each. There are 22 (64 per cent) of the 34 patients living. This percentage suggests that the combined operation and roentgen irradiation give the best results. On account of the inoperability the incompletely operated cases have a better prognosis. This agrees with the findings in 638 cases reported by Pemberton of the Mayo Clinic. Ten per cent of the patients who were not operated on lived five years or more. Apparently the cells respond well to treatment. Hilder also emphasizes that operation followed by roentgen therapy is better than operation followed by radium therapy and that surgical treatment alone produces extraordinarily poor results.

(FRAN) RICHARD J. BENNETT, J. M.D.

Jelke H. Hyperparathyroidism. A Case with Severe Kidney Change. Treated by Parathyroidectomy. (*Ueber Hyperparathyroidismus. Eine Operation. Fall mit schwerem Nierenversagen*). *Acta med. Scand.* 94, Supp. 4.

Jelke gives a survey of the reported cases of osteitis fibrosa generalisata treated by parathyroidectomy; they number about 60. He discusses the various clinical types of the disease and the well known case of the first parathyroidectomy of Mandl. He then reports the following case.

A woman of fifty eight was referred to him for surgery because of osteitis fibrosa generalisata with typical roentgen findings. There was an increased blood calcium level (19 mgm. in 100 ccm.) There were numerous calcifications in the kidneys parenchyma as well as albuminuria azotemia (non protein nitrogen amounting to 7 mgm. in 100 ccm.) and infection of the urinary passages. At operation an adenoma of the left parathyroid gland measuring 31 by 16 by 15 mm. and the normal right parathyroid gland were removed. The tumor was composed of multiple adenomas containing aqueous cells which were devoid of fat. Postoperatively there was increasing renal insufficiency with oliguria and azotemia (non protein nitrogen amounting up to 171

mgm. in 100 ccm.) and vomiting but after the parenteral administration of fluids and salt the patient's condition improved. The blood calcium level fell promptly after the operation it was 7.7 mgm. in 100 ccm. on the sixth and 6.7 mgm. in 100 ccm. on the twenty fourth postoperative day. At this time there was a convulsion with the signs of tetany. After administration of calcium and Vitamin D this disappeared and the blood calcium level remained low near the tetanic level. It was not before some months that it became normal.

Already one month after operation improvement of the bone changes could be shown roentgenologically. After two years numerous cystic defects found before operation had disappeared and had been replaced by fairly normal bone. Also the kidney calcification had been reduced both in size and number. After operation the general condition improved markedly. There was only a trace of albumin in the urine and both the azotemia and the urinary infection cleared up. The patient who had been totally disabled before operation by her pains resumed part of her work after some months and two years after operation she was fully able to work.

Jelke concludes from the result of the operation that in this case as in the majority of cases of osteitis fibrosa generalisata primary hyperparathyroidism caused the condition. II. RICHARD LAMM, M.D.

Arnold W. Parathyroid Tumor with General Calciosis (*Epithelioid parathyroid tumor mit allgemeiner Calciose*). *Arch. f. path. Anat.* 94, 3, 6, 47.

A man of forty years of age was taken ill with severe gastric symptoms (constant pain inability to eat frequent vomiting) and signs of cardiac insufficiency (irregular heart action muffled heart sounds cold hands and feet). His general condition grew rapidly worse. The blood sedimentation rate was slightly accelerated there were abundant urinary albumin leucocytes and granular casts but no emacia. In spite of the administration of strychnine the patient died of heart failure.

Autopsy revealed old pulmonary tuberculosis chronic nephritis a tumor of the right parathyroid and hypertrophy of the left parathyroid a generalized fibrous osteitis with extensive calcium metastases especially in the myocardium. There were also thromboses in several veins including the portal branches with Zahn infarcts through the open foramen oval into the larger and smaller renal arteries a duodenal ulcer necrosis of the pancreas and numerous small fatty necroses. The picture of acute hyperparathyroidism was present but there had been no clinical symptoms of bone disease.

The histological findings are described in detail with emphasis on the peculiar nuclear changes particularly in the parathyroids which were interpreted as calcium deposits and on the presence of oxyphilic cells in the infarcts in the parathyroids which supported the theory that these cells were inactive.

After discussing the value of these lesions as to the pathogenesis of generalized fibrous osteitis the

lesions of hypopharyngeal origin. Practically all of the patients with intrinsic lesions were treated by surgical measures, the small extrinsic lesions were treated by irradiation and the advanced lesions by both methods or not at all.

The decision regarding the choice between surgical excision and irradiation of laryngeal carcinoma rests largely upon the anatomical location, the extent and the clinical behavior of the lesion. The small lesion is not necessarily an early one. Although the size of the cancer and the surface area covered by it are important, the depth of infiltration, the rate of advancement and the degree of anaplasia are factors of real significance in choosing the treatment.

Surgical treatment of laryngeal carcinomas must be limited for the most part to those lesions which are confined to the vocal cords. The present practice is to use irradiation on all patients with extrinsic laryngeal carcinomas. Although it is believed that purely intrinsic carcinomas are best treated by surgical measures, a few patients with the more advanced lesions, which a few years ago would have been subjected to radical surgical procedures, have been irradiated. The excellent results which were obtained in some of these cases have led to the belief that if there is a real doubt regarding the purely intrinsic nature of the lesion, irradiation rather than surgery should be employed.

The results of surgical treatment in this series tend to confirm the opinion that surgical removal of

intrinsic lesions should produce a relatively high percentage of cures. Both hemilaryngectomy and total laryngectomy have produced cures in selected cases. The hemilaryngectomy is the operation of choice in cases in which it is applicable. Total laryngectomy done upon patients in this series with advanced extrinsic involvement has not produced cures except in 1 instance.

An analysis of the advanced intrinsic and moderately advanced extrinsic lesions treated by irradiation with total doses of 4,000 roentgens or more shows that 8 of 19 patients were living without evidence of cancer at the time of summary more than two years after treatment. This finding is definitely encouraging because most of these patients were considered inoperable when first examined. Four of 35 patients treated have survived longer than from one-half year to two years. The prognosis of course is very poor in this group and marked palliation as the result of treatment was rare.

A summary of the treatment shows that most of the intrinsic lesions were treated with surgical measures which have produced quite satisfactory results to date. Most of the advanced intrinsic and moderately advanced extrinsic lesions were treated by irradiation alone with quite satisfactory results for this type of lesion. In the far advanced ones both methods were used and in only a few instances did the treatment seem to prolong life.

NOAH D. FAICELMID

cellular character itself is intrinsic within the cell itself free of such outside influence

The principal characteristics of the astrocytoma group of tumors are diffuse character of growth enormous size moderate and uniform cellularity uniformly amorphous character in the pure forms astrocytic character of the cell in a high but variable percentage preservation of pre-existent nervous parenchyma within the tumor itself a tendency to microcystic degeneration of a type specific for astrocytomas absence of necrosis low vascularity and a slow clinical course JOHN MATHIAS M.D.

Jentzer A and Junet W *Surgery of the Hypophysis* (Chirurgie der Hypophyse) *Schweizerische Monatsschrift* 194 2 1 57

The authors report in detail concerning 4 cases of tumor of the hypophysis and 4 cases of hypophyseal tumor and/or craniopharyngioma which were operated upon by them

The first case was an 45 year old woman with acromegaly. The patient had had headaches since 1920 and since October 1921 had experienced an increase in size of her hands feet and tongue. In November 1921 she suddenly developed a scotoma in the right eye and in August 1922 she presented bilateral atrophy of the optic nerve. Upon admission to the hospital typical acromegaly and bitemporal hemianopsia with bilateral vision of 1/10 and widening of the sella turcica were found. Following x-ray irradiation there was temporary improvement in vision. In February 1923 there were exacerbation of the headaches almost complete blindness and increase in the acromegaly. On March 2 1923 bilateral decompression trepanation was done with immediate improvement of the headaches and vision. On March 6 1924 a transnasal operation was done according to the method of Segura. Upon discharge from the hospital twelve days later the visual fields were again normal. Vision was O.D. / O.S. 3 and the hands and feet were becoming normal again. After one year the menses again reappeared. The patient was well for three years. In July 1928 there appeared polydipsia polyuria (up to 14 liters in twenty four hours) glycosuria and loss of weight and later acetone appeared in the urine. Following the administration of insulin the urinary output diminished to 1500 ccm and the sugar and acetone disappeared. There was again in weight. Failure to observe the dietary regime resulted in return of the polyuria glycosuria and acetoneuria. On May 29 1930 the patient died in diabetic coma.

A woman born in 1875 had headaches since 1908 and diminution in vision beginning in 1930. An ophthalmologist made a diagnosis of tumor of the hypophysis. Hemianopsia was present. X-ray irradiation resulted in no improvement. There was an increase in size of the nose lips hands and feet. In February 1932 a two stage hypophysectomy was done but total extirpation was not possible.

The skull defects were closed with platinum plates. After three days the patient was again able to recognize colors. The visual fields improved. Following operation there was a transitory pachymeningitis and the visual fields again became worse. Since 1937 there had been an increasing polydipsia and glycosuria due to recurrence of the tumor.

The third case was that of a forty-one year old woman. Following marriage she had a gain in weight from 73 to 102 kgm and presented generalized acromegalic transformation. She was childless. Beginning October 1935 she became amenorrheic and since May 1935 she experienced a diminution in vision and suffered from headaches. She was admitted to the hospital on April 29 1936. The visual fields were narrowed and bitemporal hemianopsia was noted. The sella turcica was markedly widened. The patient had disturbances in sleep with polyuria anosmia and optical atrophy. A diagnosis of chromophobic adenoma or meningioma of the sella region was made. On May 14 1936 a total extirpation was done through a frontal approach and drainage was instituted. A walnut sized cystic hypophyseal tumor which caused stretching and upward displacement of the chiasm was found. Puncture of the cyst exocoelation and total removal of the capsule were done. Histologically an eosinophilic adenoma of the hypophysis was revealed. Postoperatively the hemianopsia disappeared. The visual fields became normal. The sense of smell returned. The headaches disappeared and the feet became smaller. The menses reappeared.

On February 4 1934 a branch of a tree fell on the head of a forty year old man. He had no loss of consciousness. One month later there was temporal papillary blanching with a sector shaped visual field narrowing in the left temporal portion. In June 1937 there was total optical atrophy bilaterally bitemporal hemianopsia adiposity impotence and increase in the size of the sella. X-ray irradiation yielded no improvement but after total extirpation of the tumor through a frontal approach and drainage the wound healed. The histologic examination revealed an adenoma resembling the eosinophil type. On the right side the vision returned up to 5/30 in the left eye blindness persisted.

A nine year old child fell upon its forehead following which a strabismus convergens developed. Four weeks later the child became totally blind. X-ray examination revealed intracranial increased pressure and pseudo intrasellar calcification. The blood pressure was 70. A posterior trepanation gave negative results. The patient collapsed. Autopsy revealed a calcified cyst of Rathke's pouch.

The fifth case was that of a fifty five year old woman. She had had buzzing in her ears of eight years duration. In December 1933 she had visual hallucinations and spots before her eyes. On February 26 and 27 1934 he was in coma and was admitted to the hospital. Convergent strabismus on the left side central facial palsy and paralysis of the

through the stalk of the gland is the mechanical importance in the normal function of the anterior lobe of the pituitary gland. JOURNAL OF MEDICAL

SPINAL CORD AND ITS COVERINGS

Kraynbehl H. Diagnosis and Therapy of Chronic Compression of the Spinal Cord with Special Emphasis on Tumors of the Cord (D. G. N. E. U. D. The. P. e. d. e. r. c. h. o. n. s. c. h. e. n. R. u. e. c. k. m. k. s. k. m. p. t. e. r. b. e. o. l. e. r. B. e. r. u. c. k. c. h. t. u. s. g. d. R. c. k. e. m. a. l. s. t. m. r. s. S. c. h. m. d. W. c. h. k. 1940 49)

On the basis of 21 cases of chronic compression of the spinal cord observed in the past two years the diagnosis and therapy of this condition are discussed. According to van Wageningen and Rossertum of the spinal cord develops in 1 of every 3,000 to 10,000 persons. More than three quarters of these tumors are located extramedullary and of the two thirds are intradural and one third extradural. Of the intradural tumors two thirds are situated dorsally or dorsolaterally and one third ventrally or ventrolaterally. When the tumor is located in the dorsolumbar region the clinical picture is that of a slowly increasing paraplegia when located at the cervical level it is that of a slowly increasing spastic tetraplegia.

In typical cases the disease picture develops in three stages. The first period is that of more or less severe paroxysmal root pains; the second period is that of weakness of the legs with disturbances of sensation and the third period is that of paraplegia. The root pains are of diagnostic importance; they often occur in paroxysmal attacks and frequently with disturbances of sensation (hyperesthesia, later anesthesia). Frequently in fact these symptoms precede by a long interval the manifestations of compression. Paresis also occurs as a post- or root symptom. Anterior root symptoms are localized muscular atrophies, pareses and reflex disturbances. Distant motor symptoms are paralysis especially of the arm extensors and the leg flexors; later disturbances of the musculotone (spastic extensor and leg flexor paraplegia); the latter (a poor prognosis) and increased reflexes. Later distant disturbances of sensation (disturbance of the position and of the vibration senses, late disturbances of pain and temperature perception and lastly disturbances of the tactile perception) and disturbance of the visceral innervation (of the bladder and colon) and pertaining to the secretion of sweat occur.

For the diagnosis of the disease may be suggested a roentgen study of the spinal column for the differentiation of tumors from tuberculous spondylitis, spondylitis deformans and the teiteldehmann deformity. Paget from a study of the spinal fluid (physical and chemical) frequently differences in pressure and differences in the protein content above and below the lesion are valuable and from myelography which serves to determine the level of the lesion. On cases on fluoroscopy on the adjustable table is used.

A chronic compression of the spinal cord develops with extrameningeal processes because of disease of the spinal column in the form of tuberculous spondylitis, primary and secondary tumors, spondylitis deformans or osteitis deformans of Paget or because of other diseases such as parasitic cysts, lymphogranuloma, leukemia, tumors, abscesses with meningeal or intramedullary processes due to tumors (extramedullary tumors with extradural meningiomas—neurofibroma, hemangioma—and intradural arachnoid intramedullary tumors in cases of ependymoma, dermoid, conglomerate, tubercle or chronic meningitis—pachymeningitis, idiopathic and post-traumatic meningitis, serosa, ependymitis, arachnoiditis, spinalitis).

Therapeutic indications in cases of tumor only laminectomy with radical extirpation comes into question. Of the 21 tabulated cases of chronic compression of the spinal cord cited by the author there were tumors (6 meningiomas, 3 neurofibromas, 1 lipoma, 1 hemangioma and 1 each of melanosarcoma, glioma, ependymoma, lymphangioma, dermoid and 2 cases which were not determined histologically): a case of tuberculous spondylitis with pachymeningitis and a case with negative findings at operation. The immediate operative mortality consisted of 2 cases (10 per cent); 3 patients died later of pulmonary complications and marasmus. Three cases were operated upon under local anesthesia; the others received intratracheal laughing gas, oxygen, ether, mixed narcosis (Toles). J. H. W. BRENNAN, M.D.

PERIPHERAL NERVES

Girardi V. C. Neurodystrophy of the Ulnar Nerve in the Elbow Region (Neurodystrophy in the cubital region). Rev. de Orthop. 1941 15

Neurodystrophy of the ulnar nerve constitutes a well defined clinical entity and derives its name from the word "dystrophy" which contains in other words the term applied to an inflammatory process of the portion of the nerve within the scous trough formed by the olecranon and the epitrochlea. The nerve is a vulnerable in this location and the resulting sequelae produce characteristic symptoms. The condition is more frequent in men than in women and occurs at various ages. The onset usually insidious for instance in patients with a cubitus valgus the first symptoms may appear from five to ten years after the development of the deformity. As to the pathogenesis the following conditions may be mentioned: post-traumatic cubitus valgus, pseudorheumatism of the epitrochlea, intra-articular osteo-cartilaginous formations, deforming arthritis of the elbow, fibrous periarthritis, osteogenic exostosis, synovial arthritis and fracture of the epitrochlea.

The symptom may be of a motor or sensory character for example paresthesias as trophic disturbances, weakness of the adductor muscle of the thumb or atrophy of the first dorsal muscles.

The presence or absence of the reaction of degeneration indicates the gravity of the lesion.

SURGERY OF THE NERVOUS SYSTEM

Clinical and roentgenographic studies reveal the type of osseous lesion. The differential diagnosis should consider recurrent dislocation of the ulnar nerve and leprosy neuritis.

The treatment is exclusively surgical and offers a choice of four methods: (1) simple liberation of the nerve or so called neurolysis, (2) widening of the gutter formed by the olecranon and the epitrochlear (3) supracondylar osteotomy, or (4) transposition of the nerve. The author favors the anterior transposition of the nerve, which gave him very satisfactory results in 9 cases described in detail.

JOSEPH K. NARAT, M.D.

MISCELLANEOUS

Grant, F. C. *Surgical Methods for the Relief of Pain*. J. Am. M. Ass., 1941, 116: 567

The decision to attempt relief of pain by blocking afferent pathways must rest on a number of factors: the position and rapidity of growth of the cancer, the probable period of life expectancy, the amount and location of the pain, the patient's reaction to it, and the dosage of opium necessary for its control, and the patient's general condition as an operative risk. If the lungs are involved or if the life expectancy is less than three months, block by the injection of alcohol into the subarachnoid space or further recourse to morphine is indicated.

The author presents findings on what can be done for relief of pain by interruption of the sensory pathways, the hazards involved, and what justification exists for suggesting these procedures. Three groups of patients have been selected: those with pain in the face and neck due to cancer of the face, jaw, mouth, and sinuses, those with pain in the arm from mammary cancer or axillary or supraclavicular metastases involving the brachial plexus, and a group with abdominal or pelvic disease producing pain anywhere below the ensiform process.

In the first group, cancer situated within the sensory area supplied by the second division of the fifth cranial nerve was most successfully handled. Results are best presented by the following table:

TABLE I—RESULTS OF SURGERY IN CANCER OF THE FACE, MOUTH, AND NECK—121 CASES, 157 PROCEDURES

	No. of cases
Alcohol injection in second and third cranial nerves, second or third division of fifth nerve	108
Pain relieved	53 (50%)
Pain partially relieved	17 (15%)
Pain not relieved	38 (35%)
Operations on fifth and/or ninth nerve and/or cervical rhizotomy	49
Pain relieved	32 (80%)
Pain partially relieved	5 (12%)
Pain not relieved	3 (7%)
Died	9 (18%)

Cancer of the breast with metastatic spread into the brachial plexus is included in the second group.

High chordotomy at the third cervical segment has been done three times, but only once with satisfactory relief of pain. This is the operation of choice because the sense of touch and position in the arm and hand is spared and its usefulness unimpaired. Rhizotomy of the posterior spinal roots from the third cervical to the second thoracic segment is considered the operation to be recommended. It necessitates a wide laminectomy of 7 vertebrae and the section of 8 posterior nerve roots. This is essential for complete relief of pain. As soon as the patient is up and around, the arm should be supported in a sling. In this series 15 cervicothoracic rhizotomies have been performed. In 8 cases pain was entirely relieved, in 5, pain recurred because of the upward spread of the growth, 2 patients died below the ensiform process is most effectively relieved by unilateral or bilateral section of the anterolateral columns of the spinal cord. This is thought to be an ideal operation when the incision is limited solely to the anterolateral columns of the spinal cord. Hazards are the possibility of motor weakness in the legs, incomplete relief of pain, and damage to sphincter control. Precautions to avoid such results must be taken. Grant advises unilateral chordotomy with repetition of the procedure on the opposite side if minor contralateral pain previously unnoticed by the patient reaches major proportions.

At present the author performs a unilateral laminectomy of the second and third thoracic vertebrae. For bilateral chordotomy the first to the fourth spines and laminae are removed and sections are made at the second thoracic segment on one side and the fourth on the other. Unilateral chordotomy has only rarely produced loss of sphincter control. In most instances control is rapidly regained.

In the reported series there were 54 bilateral and 55 unilateral chordotomies. Sixty-eight of the patients obtained complete relief, 16 experienced relief estimated at 75 per cent, 9 had only 50 per cent relief, 4 received no relief, and 12 died (11 per cent mortality).

The injection of absolute alcohol into the subarachnoid space has been performed one or more times on 31 patients. In 15 cases relief of pain was satisfactory and in 6 it was partial, 10 injections were entirely unsatisfactory. In 1 patient a partial weakness of one leg developed and persisted for about a year. A second patient had partial paralysis of both legs and complete relaxation of the sphincters, pain was unaffected.

EARL GARSIDE, M.D.

Hausman, L. *Surgical Treatment of Syphilitic Optic Atrophy*. Am. J. Ophth., 1941, 24: 119

Cases manifesting the syndrome of syphilitic chiasmal arachnoiditis have hitherto been diagnosed as tabetic optic atrophy. That cases of syphilitic primary optic atrophy (due to parenchymatous disease of the optic nerve) exist is not to be underestimated, but in view of our new experience the

outlook upon the pathogenesis of syphilitic optic atrophy should be broadened. The point to be emphasized at present is that adhesions may exist at the base of the brain in cases of syphilitic primary optic atrophy with or without signs of tabes dorsalis in the spinal cord.

Certain signs are helpful in arriving at the diagnosis of syphilitic chiasmal arachnoiditis. When patients with syphilis and primary optic atrophy present heteronymous visual field defects or multiple cranial nerve lesions adjacent to the optic nerve or when primary optic atrophy and syphilis are the only signs present, adhesions at the base of the brain in the region of the chiasm should be suspected. Visual field studies should be made early and frequently so that in the future we may know more precisely the different types of field defects that may be present in such cases.

Whether perimetric studies will disclose other defects as helpful as the heteronymous defects in localizing the site of the lesion at the chiasm remains

to be determined. Whether they will likewise prove helpful diagnostically in establishing the presence of optic adhesions remains to be seen. However, even when the visual field studies are not conclusive for diagnosis, the possible existence of adhesions around the optic chiasm and nerve should be kept in mind. This is important for therapeutic reasons, for once adequate anti-syphilitic treatment in a case of syphilitic primary optic atrophy fails to arrest the progress of visual impairment so that blindness threatens, the patient should be acquainted with the prospects of surgical intervention. At this stage of management, even severe optic atrophy is no contraindication to surgery. When blindness is imminent, no reasonable measure should be ignored.

Although the present series of cases is too small to warrant final conclusions, the results obtained thus far in the treatment of syphilitic optic atrophy due to adhesions justified the surgical approach. There was no mortality and all patients did well after the operation.

LESLIE L. MCCOY, M.D.

SURGERY OF THE THORAX

CHEST WALL AND BREAST

Hinchey, P R Nipple Discharge A Clinicopathological Study *Ann Surg*, 1941, 113 341

Some type of discharge from the nipple occurs in about 8 per cent of all mammary lesions A sanguineous discharge occurred in 6 per cent of 5,118 patients coming to the Johns Hopkins Hospital because of a breast complaint

Sixty-seven cases of nipple discharge are reported The discharge contained blood in 35 instances Three lesions were responsible for about three-quarters of the cases—carcinoma, chronic cystic mastitis, and papilloma Papilloma is a precancerous condition Chronic cystic mastitis, with epithelial hyperplasia, is also to be regarded as precancerous

Twenty-four women had cancer, 12 of them had a non-sanguineous discharge, and in 11 women discharge was the first warning of any disease in the breast Four women had no mass in the breast at the time of their first examination Contrary to common experience, chronic cystic mastitis was encountered more than twice as often as papilloma

The chief problem is the discharging breast in which no mass is palpable Such a breast must be suspected of harboring not only the precancerous conditions of a papilloma or chronic cystic mastitis with epithelial hyperplasia, but even an actual cancer

Treatment consists of local surgery or mastectomy Radiation therapy has not proved to be of value A definite number of cases require not operation, but observation The surgeon, however, should try to make this latter group as small as possible, by consideration of all possible surgical indications In this manner, important cancer-preventive surgery can be performed and the surgeon will occasionally be rewarded by the discovery of an early, impalpable cancer

JOSEPH K. NARAT, M D

Savarese, E A Study of 2 Cases of Tuberculosis of the Breast (Osservazioni sopra due casi di tubercolosi mammaria) *Polidm*, Rome, 1940, 47 sez chir, 378

The author describes 2 cases of tuberculosis of the breast in women fifty-nine and sixty-three years of age, in which operation was performed Photomicrographs of the histological findings are given Both patients made an uneventful recovery

In connection with these cases the author discusses some of the most disputed points in regard to tuberculosis of the breast In the first place, some authors hold that the breast can be infected directly through the galactophorous ducts, while others believe that the infection is hematogenous, and still others think that it is retrograde through the lymphatics Probably the hematogenous theory is the one most generally accepted, but in the author's

cases there was evidence of lymphatic infection This may take place not only by retrograde transmission but also by contiguity from progressive tuberculous degeneration of the walls of the lymphatics Often palpation shows lymphatic cords extending from the axillary glands to the lesions in the breast In the author's cases the axillary-gland lesions preceded the mammary-gland involvement by three and four months and lymphatic tracts could be demonstrated connecting the two sites

There is also considerable difference of opinion in regard to the frequency of the disease Among 476 cases of disease of the breast examined by the author he found only these 2 cases of tuberculosis, which amounted to 0.4 per cent He thinks, therefore, that it is a very rare disease

There is difference of opinion also in regard to the predisposing causes of the disease Some think that it occurs chiefly during the age of sexual activity, but the author's cases in old women who had never been married argues against this theory Trauma and old infection of the breast are given as predisposing causes but neither of these was present in either of the author's cases

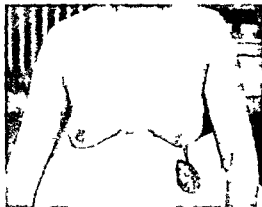
From the point of view of pathological anatomy there is difference of opinion as to whether the tuberculosis originates inside or outside of the mammary gland The author's cases argue in favor of a mesodermic origin of the disease

There is a form of the disease called the sclerolymphatic type in which the resemblance to carcinoma is very close Differential diagnosis can often be made only by careful histological examination Enlargement of the axillary glands is an important diagnostic point In tuberculosis this is generally out of proportion to the breast tumor and is larger and more rapid in development than in cancer, it is of the plastic inflammatory type with a tendency toward early softening and ulceration Often the patients come for treatment for the gland affection rather than that of the breast Some authors believe the differentiation between cancer and tumor is not of great importance because both require surgical treatment, this is not true, however, for less radical operation is required in tuberculosis and the prognosis is much less grave Therefore, every effort should be made to arrive at a differential diagnosis

AUDREY G. MORGAN, M D

Spoto, P A Contribution to Our Knowledge of Fibromas and Fibromyomas of the Nipple (Contributo allo studio dei fibromi e fibromiomi del capezzolo) *Clin ostet*, 1940, 42 422

Fibromas of the nipple are very rare Spoto briefly mentions one of the relatively more frequent cases of general neurofibromatosis with one small tumor localized on the nipple He then describes in detail the extremely rare case of a pendulous fibroma of



F. The author's patient with solitary pleural thromboma of the nipple

the nipple. No more than a dozen of such cases have yet been published.

The patient, an elderly woman, asserted to have noticed a little tumor on the left nipple since her childhood. At the beginning of puberty it had only the volume of a chick pea. During menstruation it became softer, however, without growing in size. It had reached the size of an almond when the patient went through her only pregnancy at the age of twenty-six years. During the nursing period milk trickled out of that part of the tumor where the stalk was inserted. During the last thirty years the tumor had its present size. The left nipple was apparently substituted by a cylindrical stalk of the size of a little finger. On this stalk a tumor was suspended, its size was like that of an almond. It had a knobby surface, was of a grayish color with darker colored furrows which made it suggest a big mulberry. It was homogeneously hard and fibrous. The tumor was removed and the trunk was sutured.

The tumor weighed 25 gm. The cut clearly showed an outer grayish festooned portion from 0.5 to 2 mm thick and an inner white fibrous portion.

Histologically, the outer portion was covered by a stratified epithelium similar to that on the surface of the nipple. Beams of the same kind of epithelium extended into the underlying stratum of the connective tissue. By division and anastomosis they formed a network containing strands of a different tissue composed of connective and plain muscle fibers. In some regions the muscle fibers showed hyaline degeneration and the connective tissue appeared to be degenerated so that it looked almost myxomatous.

The author concluded that the tumor partially underwent regressive processes. There were sporadic gaps in the tissue coated with an epithelium of prismatic and cubic cells and supported by a stratum of connective tissue with interspersed smooth muscle fibers which were arranged mostly in a circular shape; these were presumably residual milk duct. The stalk of the tumor was richly provided

with blood vessels. Part of which showed granular cells.

NEIDA C. SMITH

TRACHEA LUNGS AND PLEURA

Jacobus H. C. and Bruce T. A Bronchospirational Study on the Ability of the Human Lung to Substitute for One Another. A Bronchospirational Experiment in Which One of the Lungs was Completely Cut Off from Respiration. II. Bronchospirational Experiment with Both Lungs Breathing One Nitrogen and the Other Oxygen with or without the Administration to One Lung of Carbon Dioxide in Such a Concentration as to Prevent the Elimination of Carbon Dioxide from the Lung in Question. *Acta Med Scand* 94: 15-93, 1927.

This article which is divided into two parts deals with a bronchospirational study and experiments to prove the ability of one human lung to take over the function of the other lung. The authors presuppose that readers understand the technique and procedure used in bronchospirational studies. They review the history of the study of lung function in this historical information dating back as far as 1892. They also discuss the historical aspects of the use of the bronchospirational method from an experimental and diagnostic standpoint. After this review they give the results of bronchospirational experiments in the human being using different cases to test out the ability of one lung to substitute for the other.

Bronchospirational experiments with human subjects in which one lung is made to breathe oxygen and the other nitrogen cause no greater discomfort than ordinary bronchospirational experiments when both lungs breathe oxygen. Experiments with one lung breathing oxygen and the other nitrogen to which enough carbon dioxide is added to prevent the output of carbon dioxide from the lung cause considerable dyspnea but not so much that the subjects cannot very well continue with the examination.

The oxygen consumption during both the nitrogen and nitrogen and carbon dioxide experiments is about as great as in ordinary bronchospirational studies under these experimental conditions. The oxygen breathing lung alone answers for as large an oxygen intake as both lungs together in ordinary bronchospirational studies. The lack of dyspnea when one lung breathes pure nitrogen shows that the oxygen breathing lung satisfies the oxygen need by erythrocytic breathing, i.e., it takes up a large amount of oxygen from a small amount of inspired air. The ventilation equivalent for oxygen for the oxygen breathing lung was also extremely low, 1.03 and 1.16 respectively in the two experiments. When one lung breathes nitrogen plus carbon dioxide the dyspnea causes the ventilation equivalent for the oxygen breathing lung to rise nearer the normal level. When one lung breathes oxygen and the other a gas mixture with a lower oxygen content than atmospheric air, extremely high values for the ventilation equivalent for oxygen are obtained. Thus one lung given air containing 8.3 per cent oxygen showed the greatly pathological value of 10.40.

When one lung breathes nitrogen or nitrogen plus carbon dioxide, oxygen is given off by this lung until the oxygen tension in its spirometer becomes equal to that in the blood passing through it.

When one lung breathes nitrogen, just as much carbon dioxide is given off from the oxygen breathing as from the nitrogen breathing lung. Thus the excretion of carbon dioxide can proceed quite independently of the oxygen intake. When one lung breathes nitrogen or nitrogen plus carbon dioxide, oxygen is given off by this lung until the oxygen tension in its spirometer becomes equal to that in the blood passing through it.

When one lung breathes nitrogen just as much carbon dioxide is given off from the oxygen breathing as from the nitrogen breathing lung. Thus the excretion of carbon dioxide can proceed quite independently of the oxygen intake. When one lung breathes oxygen and the other a mixture of carbon dioxide and nitrogen, the oxygen breathing lung takes entire care of not only the oxygen intake, but also the carbon dioxide excretion necessary for the organism, while the other lung is entirely prevented from participating in the respiration. When one lung is prevented from giving off carbon dioxide by the addition of carbon dioxide to the oxygen spirometer and the other lung breathes pure nitrogen, the latter lung takes care of the necessary carbon-dioxide output alone, the lung breathing oxygen and carbon dioxide acts as a re-absorption organ by alone and exclusively taking care of the oxygen intake, and the nitrogen-breathing lung functions as an excretory organ by being used solely for the elimination of carbon dioxide.

The oxygen saturation in the arterial blood falls both when one lung breathes nitrogen and nitrogen plus carbon dioxide, because the blood passing through it cannot be arterialized. Lick's formula for calculating the apportionment of the cardiac output to the lungs under these conditions does not give uniform results. In two experiments which can be considered to represent the norm, however, the calculations pointed to an equal distribution of the blood to the two lungs. That the circulation is maintained in a lung breathing nitrogen or nitrogen and carbon dioxide, is evident from the invariable drop in the arterial oxygen saturation and the fact that the nitrogen breathing lung continues to eliminate carbon dioxide.

The relative values for the minute volume of the heart obtained tonometrically by determinations of the pulse rate and blood pressure indicate that there is no increase in this volume during nitrogen or nitrogen and carbon-dioxide bronchspirometry.

PAUL MERRILL, M.D.

Chandler, F. G., Mason, G. A., Livingstone, J. L., Edwards, T., and Others. A Discussion on the Treatment of Traumatic Hemothorax. *Proc Roy Soc Med*, Lond, 1940, 34, 73.

There surely can be no doubt that the lung itself is frequently the source of hemothorax. As regards

absorptive treatment with drugs, there must be few today who would hold it of any value. The exploring needle is essential for diagnosis and for the early detection of infection. It may have to be employed repeatedly. With proper technique it is without danger and should be practically painless.

The value of roentgenography, both in diagnosis and subsequent control of the case, cannot be exaggerated.

The problem of treatment cannot be reduced to a simple formula, for the hemothorax may be (1) simple and non-infected, (2) infected or (3) complicated by many other factors.

A simple and non-infected hemothorax, (a) small and probably not requiring treatment, or (b) not small and demanding treatment, would present different characteristics. A small hemothorax would be one with physical signs of fluid only at its extreme base, the skiagram would show fluid in the costophrenic sinus and the dome of the diaphragm would be visible. If the dome was nearly obscured there would be probably half a pint of blood or more.

The infection in a hemothorax would be indicated by bacteriological examination (aerobic or anaerobic), by odor, or by massive clotting. If the blood withdrawn by the exploring syringe had any unpleasant odor, it must be assumed that the hemothorax was infected, no matter what the bacteriological report, and treated accordingly without delay. There should be no waiting for evidence of toxemia. Delay in recognition and treatment by efficient drainage greatly increased the mortality in the last war.

Other complications were open wound of the thorax, indrawn splinters of bone, missiles, clothing, damage to the lung with or without a retained foreign body, pneumothorax, vascular or otherwise, perforation of the diaphragm, and injuries to other parts.

The first essentials of treatment of simple, non-infected hemothorax are rest and the treatment of shock, blood loss, and pain by the usual methods, the relief of cough and dyspnea, and the promotion of sleep.

M & B 693, protosil, proseptasine, rubiazol, sulfathiazole, and allied chemicals will probably be used in an attempt to limit, control, or prevent infection in the lung and tissues generally.

If the hemothorax is small and uninfected, nothing more need be done, otherwise early aspiration by air or oxygen replacement is advocated. By early is meant within twenty-four or forty-eight hours, unless urgent dyspnea or extreme mediastinal displacement makes even earlier treatment necessary. Aspiration may be indicated in the first few hours or not for days. By the replacement method there is no disturbance of the mediastinum, no encouragement to further bleeding, and no danger. If a considerable amount of blood be left, the sequelae may be pleural thickening, non-expansion of the lung, and calcification. After replacement, a skiagram of the lung may reveal foreign bodies which before were obscured by the overlying blood.

There is no need today to stress the fact that to aspirate any considerable quantity of fluid without admitting air is dangerous. The slightest discomfort, a feeling of tightness and cough are all indication that the pleural pressure is becoming dangerously negative.

After a piration of all the blood possible, watch must be kept for the reaccumulation of fluid. This may be determined by means of physical signs or with x rays, preferably the latter. If there is a reaccumulation, exploratory puncture to determine the nature of the fluid is indicated.

When the patient's condition permits, breathing exercises to restore diaphragmatic movement and basal expansion are an essential part of the after-treatment.

Hovle stated that during the last war it was found that a traumatic hemothorax which remained sterile had practically no mortality after the first two days. The average period of invalidism for these patients was about three months; 5 per cent left the Services, and the majority of the remainder became fit for duty in less than six months. But infection was common as it occurred in a third of all the patients, and for these the prospect was grim, there was a mortality approaching 50 per cent within a few weeks, with a third of the survivors leaving active service after seven months in the hospital, and a fair number taking a year before returning to duty. Many of these kept the legacy of a collapsed lung and rigid thorax and never became restored to health or to efficiency. Taking all these together with those who died within the first two days from hemorrhage or from tension hemothorax and the ultimate catastrophes which postwar figures never traced, there is no doubt that the toll of traumatic hemothorax was high.

The importance of the presence of traumatized lung tissue or of a foreign body is so great that it properly forms the basis upon which the treatment of traumatic hemothorax should be considered, as indeed it did among those experienced in the last war. Thus we distinguish simple hemothorax from what for convenience is termed compound hemothorax, the latter term implying that the hemothorax is accompanied by important injury to the lung or to the chest wall or by a retained foreign body which is regarded as significant. In the simple form the hemothorax is the chief lesion; it does well with conservative management and operative measures are rarely needed. In the compound form the hemothorax is no more than an incident that happens to occur in a complicated injury; it responds poorly to conservative management and operative measures are usually advisable.

It is convenient to deal with it under four headings: the early management during the period when shock and the effects of hemothorax or of tension with the pleura are of chief importance; the subsequent management of the simple and then the compound hemothorax; and the management of the infected hemothorax.

During the first few hours all patients with hemothorax should be grouped together for the initial shock of the injury has to be controlled, the effects of hemorrhage overcome and pleural tension relieved. They should be rested in a sitting position if there is any respiratory difficulty, but otherwise especially if shock is severe recumbency is better. Morphine is needed for the relief of pain and anxiety and for securing sleep. Only if there is much associated hemoptysis should morphine be used with caution; for then it may well favor the aspiration of blood into the opposite bronchial tree and lead to collapse of the lower lobe on that side. Morphine by relieving pain may actually facilitate collapse after a chest injury and at any rate with a large hemothorax the danger that cough may produce further bleeding is not material.

Transfusion is required for large effusions especially if they have accumulated rapidly. Blood is preferable to plasma, although in an emergency a transfusion can be started with plasma while the patient is being matched. Quite a large hemothorax can be tolerated without much dyspnea provided that it accumulates slowly, but if there is any evidence of increased intrapleural pressure blood should be removed by aspiration and replaced with air. The amount of air introduced is less than the amount of blood removed in such cases and has to be gauged individually.

A simple hemothorax or hemopneumothorax may be found after a small penetrating wound of the chest without at any time having led to noticeable symptoms. It may indeed be found accidentally without any other evidence of a chest injury. Whatever the symptoms or size, a sample of the blood should be obtained to confirm the diagnosis, which is by no means always easy without needling and also to exclude infection. For this smear should be made at the time with a culture report following. It is not accurate to assume that a hemothorax is uninfected because there is no change in color on laking; a small infection on unless it is a mixed one does not always produce such changes early.

Apart from the removal of blood for mechanical reasons already mentioned, there are other good reasons why a simple hemothorax should be treated routinely by air replacement. One of the most important is the lengthy time that is required for such effusions to absorb—a process which takes weeks or months if left untreated, can be effected in less than an hour by aspiration with air replacement. Again because infection is so prone to attack the pleura in these patients it is important not only to remove such an excellent culture medium as blood but also to effect reexpansion of the lung and obliteration of the pleural space quickly, as is consistent with safety and comfort and this can be done only with air replacement.

Among the difficulties of air replacement a dry tap is often due to the choice of too low a site for aspiration, in turn due to the fact that the diaphragm on the affected side is in these patients usually

SURGERY OF THE THORAX

situated at a high level. Another difficulty is that villous tags of fibrin may block any but large cannulae. If a posterior site is chosen for aspiration, difficulty may be had because of the fact that the end of the cannula comes into contact with the re-expanding lung as fluid is withdrawn, what has been an easy aspiration suddenly becomes one in which any further blood is withdrawn only with the greatest difficulty. This can be remedied by introducing air when the lung collapses again away from the aspirating needle and the blood once more begins to flow readily.

There are a few examples of simple hemothorax with massive clotting, which forms either a gelatinous mass or a carpet of fibrin and entangled corpuscles. Failure to aspirate a hemothorax after using proper technique should always arouse the suspicion that this state of affairs exists. A massive gelatinous clot gives a roentgenological picture which is in no way distinctive, and with a fibrin clot the appearance is likely to lead to its recognition only if gas is also present, and if a hematoma of the lung can be excluded. A solid hemothorax should be evacuated by open thoracotomy provided that the general condition of the patient permits, for it is a potent source of subsequent ill-health as it absorbs only with much difficulty.

The term "compound hemothorax" includes all those examples of traumatic hemothorax which are accompanied by evidence of serious injury to the lung or chest wall, or by a retained foreign body.

If it seems probable that a considerable laceration of the lung or hematoma is present, thoracotomy is the treatment of choice provided that it is done within about six hours from the time of injury and provided also that shock and the effects of hemorrhage have been controlled sufficiently well to make surgery judicious. The advantages of surgical treatment are that it allows excision of the wounds, provides opportunity of emptying the pleural cavity thoroughly and of arresting hemorrhage, allows the removal of traumatized segments of lung, and also allows healthy lung to be inflated at the end of the operation and the pleural cavity to be drained. The results can be dramatic, and patients who otherwise would pass through many weeks or months of dangerous illness can be rapidly restored to health.

The possibility of infection in a hemothorax must be kept constantly in mind, for it may occur later, up to several weeks after injury. The classical features are not always found, and often the only certain means of diagnosis is the aspirating needle. If organisms are found in smears, treatment should begin at once, it is unwise to wait for confirmation from culture reports as the growth in the chest is at least as rapid as in the media, and delay may mean disaster.

The correct treatment of an infected hemothorax in its early stages is repeated aspiration, as it is for other forms of empyema. It is a mistake to insert a drainage tube until the infection has become localized. The proper re-expansion of the lung is a slow

and difficult process in these patients, and if a tube is used too early there is risk not only of collapse of the lung due to the admission of air, but also that loculation of the infection is made more likely and subsequent drainage more difficult. The result is that recovery is slow and hazardous.

Surgeon Commander G. A. MASON states that injuries to the parietes, lung, mediastinum, heart, and abdominal viscera—when the diaphragm is torn—are among the causes of traumatic hemothorax. External wounds and retained foreign bodies may or may not be associated with these injuries.

Unless a large vessel is injured, bleeding in cases of closed hemothorax is apt to cease spontaneously by clotting and as the pressure in the pleural cavity attains equilibrium with that in the bleeding vessel.

If infection does not develop, the hemothorax may be allowed to absorb spontaneously, or aspiration and air replacement may be employed. The latter is usually desirable as it shortens convalescence and facilitates adequate x-ray inspection of the thoracic contents. It is done according to preference from four to six days after the injury, but not earlier than the third lest further bleeding be precipitated, or later than ten days if there is no definite x-ray evidence of commencing absorption.

Routine exploratory operation has been advocated for all penetrating wounds of the chest seen within the first twelve hours—as for similar wounds elsewhere. A major operation should not, however, be undertaken for small, non-sucking wounds, provided there is no progressive hemorrhage and no suggestion of involvement of the abdominal viscera. These small wounds merely require excision and suture under local anesthesia.

Evidence of continued or recurrent bleeding and the supervention of infection are, therefore, indications for exploratory operation. It is also indicated if there is evidence, from the nature of the injury or from the presence of peritonism, of abdominal thoracic injury. Early operation is also called for when there are jagged wounds, or evidence, roentgenological or presumptive, of the presence of large foreign bodies or of bronchopleural fistulas. This last complication may be recognized sometimes by the coughing of bloody froth in association with the signs of pneumothorax, and if the latter is of the valvular variety, by severe distress due to the raised tension within the pleural cavity.

Wound edges must be excised and any fragments removed. These wounds may, by suitable traction, permit of a complete exploration of the pleural cavity. If not, they must be closed and a deliberate thoracotomy carried out. This may be done through the standard posterolateral thoracotomy incision along a middle intercostal space, with the patient lying on the opposite side, adequate exposure being obtained by means of expanding retractors. A similar, but not quite such a good exposure, may be obtained by an incision opening into the intercostal space anteriorly. Further exposure may be obtained by dividing the rib or cartilage above or below

Blood is evacuated from the pleura by suction or failing that by means of absorbent pads or sponges in which case unnecessary scrubbing of the pleura should be avoided. Bleeding points are controlled by forceps and ligation by diathermy if the vessel is small and if a non-explosive anesthetic is being used or if need be by leaving tampons in position. The dual pulmonary circulation permits of ligation of the main vessels of the lung without fear of necrosis. Lacerations in the lung are repaired or if a lobe is badly shattered it is removed and the diaphragm and pericardium are inspected for tears which if present are opened up and injuries of the viscera beyond them are searched for and dealt with.

If the parietes cannot be closed secundum artem because of extreme damage or because of the general state then tampons must be arranged to occlude the external wounds and to prevent a sucking pneumothorax. Elastoplast strips are placed across them to firmly support the chest wall. Some care is needed when working on the right side of the chest lest these packs press unduly against the great veins and interfere with the return of blood to the heart. Such packs will require changing usually in from four to ten days. Signs of infection call for early removal.

One of the principal objectives after any thoracic operation or injury is not only to restore maximum functional efficiency of the chest but also to obtain complete occlusion of the pleural space by re-expansion of the lung if possible.

LIVINGSTONE. In ward full of septic cases it is wise to do the gas replacement in a side room under full aseptic precautions to minimize the risk of infection. The operation should be done early in twenty-four hours before clotting or infection has taken place.

EDWARDS was of the opinion that once the condition of shock had passed the sooner the blood within the pleural cavity was removed the better.

There was no risk of recurrence of the hemorrhage if arising from the lung provided that the blood removed was replaced by the same quantity of air. This could be done with a pneumothorax apparatus if available through a second needle puncture through the same two-way needle as that used for apiration. After two or three syringes of blood were removed in the latter case a similar quantity of air was injected.

Early aspiration had obvious advantages:

1. It removed the blood before clotting occurred.
2. It removed an excellent culture medium for organisms.

3. When the hemorrhage was the result of damage to the vessels of the chest wall and was continuing it could be diagnosed early by roentgenological examination or physical signs and before the general signs of hemorrhage were present if gas replacement had been carried out early as the increase in fluid within the pleura was obviously owing to the presence of the air. When air replacement had not been carried out bleeding might continue without alteration in the physical or roentgenological signs as the

lung gradually collapsed beneath the fluid until general signs of internal hemorrhage appeared.

4. It prevented the late results of pleural fibrosis and chest contraction and the occasional occurrence of encysted collections in the pleura.

With regard to the objection which had been raised to repeated aspiration that it increased the risk of infection of the chest wall it must be stated that such infection often resulted when airtight intercostal drainage was adopted. In any case the risk of infection of the chest wall could be overcome by a method suggested by the speaker many years ago. This consisted in an incision of the chest wall under local anesthesia down to or even including a portion of rib but without opening the pleura. Aspiration was carried out through the intercostal space or rib bed and on its completion the incision was packed with flavine gauze. When further aspiration was required the pack was removed and the needle inserted as before. This had the advantage that the granulation tissue formed around the pack prevented the spread of infection in the chest wall and also permitted painless aspiration without the use of local anesthesia.

THOMPSON stated that the immediate treatment of traumatic hemothorax is essentially the immediate treatment of the injury to the chest and of the general condition of the patient. Every hemothorax is accompanied sooner or later by a serious effusion so that the fluid in the chest is not pure blood. This is easily shown by estimation of the hemoglobin in the fluid.

Aspiration of blood with air replacement was very generally advocated at this meeting but Thompson regarded replacement as a purely emergency measure. He says it is done to collapse the lung and prevent further hemorrhage from the lung itself. Once the hemorrhage has ceased it is the aim to obtain re-expansion of the lung as soon as possible and for this purpose it is necessary to remove the air as soon as it is considered safe. As a general principle it is unwise to introduce air into an infected pleural space before adhesions have developed. It merely produces a total empyema when by aspirations or by closed intercostal drainage without the admittance of air the empyema space can be limited to a localized posterior pocket which heals readily with adequate drainage.

BROCK says that in the simple type of hemothorax a patient usually satisfactory except when clotting has occurred. Such cases may have to be treated by open evacuation of the clot. Apiration should be done early although it is usually neither convenient nor kind to submit the patient to it until he has had an opportunity to rest after his trying experience. This usually means eighteen to twenty-four hours after injury.

In the compound variety of hemothorax a major surgical wound which demands operation is usually present and the hemothorax should be dealt with incidentally at the same time. However the hemothorax is put so prominently in the clinical picture





Fig 3



Fig 4

exist which are capable of altering the normal balance of these elements hence the volume of the lung.

Five cases are reported the first of which is that of atelectasis due to a bronchogenic carcinoma which occluded the left upper bronchus in which compensatory signs of retraction of the ribs displacement of the mediastinum and elevation or paradoxical movement of the diaphragm were lacking because of the extensive emphysema of the lower lobe. In the second case caused by mediastinitis paradoxical motion of the diaphragm was present but the failure of the mediastinum to become displaced gave evidence of its inflammatory fixation. The last case in which two transitory episodes characterized by opacity of the right upper lobe occurred was believed to be due to reflex organic rather than pre-existing pulmonary lesion.

Since the essential condition of the atelectatic state is a reduction in volume of the lung it would be logical to assume that the prime radiological sign would be an increased density of the involved region. This is not invariably true however and the functional compensatory signs may appear without the slightest increase in density on the roentgenogram. The absence of this diagnostic point may be accounted for on the basis of the marked effect of an overlapping emphysematous lobe or the film may have been made before sufficient air had been absorbed from the alveolar spaces; to the blood stream to render the increased density appreciable. Once established the opacity is rather characteristic. Seen in the anteroposterior view it is ordinarily homogeneous much like soft tissues elsewhere or there may be seen cord like streak on a homogeneous base. The major opacity is most often found near the hilus or the bases. The reduction in volume of the lung is best perceived in the lateral view. The flattening of the thoracic cage and the narrowing of the intercostal spaces are familiar signs which although not always present are frequently confirmatory. Another radiological sign which may be of value is the unusual visualization of the left bronchus in the laterolateral projection as well as the bifurcation of the trachea a point noted in most of the

authors series. In the displacement of the mediastinum already mentioned it is interesting to observe that the esophagus is rarely affected contrary to the situation in a cirrhotic or adhesive process. The paradoxical motion of the diaphragm is well known as is the diaphragmatic elevation and the pendulous position of the mediastinum.

In conclusion the author stresses the fact that no single sign is pathognomonic and the diagnosis must be made with consideration of the picture as a whole including the etiology and endothoracic mechanics involved.

EDWIN F. R. SWORTH, M.D.

Hanrahan E. M. Adm. R. and Klopstock, R.
The Role of Experimentally Produced Intrapleural Adhesions in Experimental Pneumolysis and in the Prevention of Surgical Atelectasis in Animals. *J. Thorac. Surg.* 94: 84.

The search for a simple non harmful method of consistently producing obligatory pleuritis has been extended through a large volume of material and a considerable range of experimental methods with informative but variable results. The work has demonstrated that experimental pleural adhesions can be produced by a variety of physical and chemical agents. It is suggested that iodized talc and India ink are the most satisfactory of the substances both of which depend for their effect upon the action of particulate matter plus chemical irritation. The use of a liquid suspension makes pleural poudrage simpler to perform and easier to control than the use of atomizers or blowers in conjunction with thoracoscopic or manometric control.

Saline solution is a satisfactory suspending medium but distilled water would seem to have the disadvantage of being itself a temporary tissue irritant yet readily absorbable. Ether is effective as a suspending medium but elicits incompatibly violent reactions unless controlled by dilution or by the use of substances such as oil which slow its rate of absorption. The effects noted within two months following one or two injections of silica and talc suspension are comparable with those following poudrage in the dry state.

pleural pneumothorax have introduced a method of the apv which is less destructive than thoracoplasty in situations in which the latter is contraindicated. Iotta in 1936 and 1937 proposed the use of vessel ne injected extrapleurally to cause collapse of the infected pulmonary apex. He reported on 12 patients so treated. Omodei Zorini used and improved Rotta's technique in 1938 when he reported on 10 cases which he treated. A somewhat blunt needle was inserted in the fourth, fifth or sixth intercostal space at the medial border of the scapula down to the connective tissue between the endothoracic fascia and the parietal pleura. After a manometric reading had shown no fluctuations indicative of endopleural puncture from 100 to 150 cm of novocaine solution were injected, then a gas either filtered or oxygen was introduced under a positive pressure of from 30 to 40 cm. To prevent the rapid absorption of the gas and to maintain the collapse a mixture of pure paraffin vaseline oil which melts at from 38 to 39 degrees was introduced. This was of a semi-solid or paste-like consistency at body temperature. By these methods Rotta and Omodei Zorini have maintained pulmonary collapse for a long time with excellent clinical results.

The author briefly reports 2 clinical cases treated by extrapleural pneumothorax. The first was that of a twenty-four-year-old male who had had an exudative pleurisy on the left side at the age of sixteen years. For the past month he had been suffering from as then a cough, night sweats and fever associated with a considerable loss of weight. X-ray examination revealed tuberculous infiltration in both upper lobes. Extrapleural pneumothorax controlled the process, restored general health and brought the temperature back to normal so that the patient could safely undertake the journey back home.

The second case was that of a twenty-five-year-old male patient who at the age of twelve years had suffered from an exudative pleurisy on the left side which had been cured after four months. In the past year he had suffered from an attack of influenza which was followed by persistent cough, night sweats, asthenia and loss of weight. The sputum was positive for tubercle bacilli and x-ray examination revealed a large cavity in the left apex. Extrapleural pneumothorax at first permitted the injection of 100 cc of gas which later could be increased to 200 cc. The general condition of the patient rapidly improved, he gained weight, his sputum became negative for tubercle bacilli and his appetite and general health improved markedly. The progress and improvement of this patient justified the necessity of doing a plastic operation to obliterate the cavity. Refills have been made for the past ten months at intervals of from two to three months with hope of ultimate cure.

The author concludes that extrapleural pneumothorax constitutes an important addition to the technique of collapse therapy. He emphasizes the rule that in this case the extrapleural sac must be maintained.

JACOB E. KLEIN, M.D.

Neuhof H, Tourff A S W and Aufses A H.
The Surgical Treatment by Drainage of Subacute and Chronic Purulent Abscesses of the Lung.
J S G 1941 113 09

In the authors' opinion on abscess of the lung in its acute stage is a surgical disease and it should not be permitted to pass into a chronic stage. The authors believe that the majority of acute abscesses are single lesions and that they are uncomplicated during the first six weeks. After that the abscesses are classified as subacute and they may remain localized or extend by spillover infection and gangrenous extensions. Surrounding fibrosis begins in this stage. In the chronic state (after twelve weeks) they represent the features of the subacute abscess plus pulmonary fibrosis and bronchiectases. The chronic abscess may be single but is often diffuse and multiple.

Surgical drainage is the treatment of choice in all cases of pulmonary abscess except the diffuse type. The authors prefer to operate in one stage after having exactly localized the abscess. One or two ribs are removed, the abscess is unroofed, communicating cavities are drained and the whole cavity is packed with gauze. If the wound is outside of the area of pleural adhesion, the suture line is to the parietal pleura and drainage through the walled-off area.

The chief dangers are cerebral embolism which is partly avoidable by having the patient in the Trendelenburg position, pleural infection which should be avoided, and spillover gangrenous bronchopneumonia.

Of 104 patients with acute abscess who were operated upon, 100 are well and 4 are dead.

Of 63 patients with localized subacute and chronic abscesses operated upon, 47 are cured, 4 are benefited and 10 are dead.

Of 4 patients with diffuse lesions, 5 are cured, 8 are benefited and 25 are dead.

JULIAN A. MOORE, M.D.

Brea M M and Talana J A. Diagnosis of the Surgical Disorders of the Thorax. Procedures and Semiological Technique. (Diagnosis of the affections of the thorax. A practical manual of the technique of diagnosis.) Bol. St. d. Clin. q. U. d. B. N. A. S. 94 16 675

The authors present the method of diagnosis which they use in the study of surgical disorders of the thorax and indicate the respective importance of the clinical signs and the examination procedure. Among the semiological procedures they discuss successively:

1. Anamnesis with special attention to painful cough, expectoration, hemoptysis, dyspnea and changes in the general condition.

Physical examination

3. Respiratory syndromes including the condensation on cavity, atelectatic pleural pneumothorax, mediastinal and painful plicostovertebral syndromes and those of paralysis of the diaphragm.

4 Laboratory examinations of the urine, blood, feces, sputum, and material obtained by bronchoscopy and puncture, and serological and immunological tests

5 Functional examinations, there are no exact functional tests, but the organic equilibrium of the individual can be evaluated by the axillary and rectal temperature curve, pulse frequency, arterial and venous pressure, frequency of respiration, time of voluntary apnea, vital capacity, basal metabolism and respiratory quotient, concentration of gases in blood and alveolar air, and cardiorespiratory response to effort and to installation of artificial pneumothorax

6 Roentgen examination, including simple fluoroscopy and roentgenography, deep roentgenography, tomography, contrast bronchography, and roentgenography following the administration of a contrast substance or following pneumothorax, pneumoperitoneum, opaque filling of the esophagus, or opaque or gaseous filling of the stomach or colon

7 Bronchoscopy which, however, is contraindicated in grave, debilitated, tachycardiac, and hypotensive cases, in acute pulmonary processes during full evolution, and in serious bronchopulmonary hemorrhage

8 Thoracoscopy

9 Esophagoscopy

10 Cavernoscopy

11 Fistuloscopy

12 Exploratory puncture

13 Exploratory thoracotomy

The systematic use of these procedures leads to the diagnosis of most thoracic disorders. As to special procedures and from the topographic point of view, the pulmonary parenchyma is explored by deep roentgenography and tomography which localize pathological cavities, by artificial pneumothorax which isolates the pulmonary picture, and by thoracoscopy which allows direct inspection of the surface of the lung, the bronchial tract is explored by bronchoscopy, contrast bronchography, and deep roentgenography, the pleural cavity by puncture, simple and contrasting roentgenography, thoracoscopy, and biopsy, and the mediastinum, costopleural wall, and diaphragm are explored by pneumothorax, pneumoperitoneum, and thoracoscopy. Examination of the sputum, puncture fluid, and biopsy material to corroborate or complement clinical data is very important for the etiological diagnosis.

The value of the semiological procedures in the clinical diagnosis of various pulmonary disorders is discussed. In bronchopulmonary cancer, the symptoms can be placed in three groups: those caused exclusively by the tumor (dry and persistent cough, hemoptysis, dyspnea, and bronchial obstruction), those due to complications, such as atelectasis and infection (signs of bronchial dilatation, pulmonary or pleural suppuration, and unresorbed false pneumonia), and those caused by extension (pain, mediastinal, and pleural syndromes, and signs of

metastasis to the viscera and lymph nodes). The roentgen picture is specific and its polymorphism well known. The histological diagnosis is made indirectly from sputum and pleural effusions (inclusion method) and directly from bioptic material obtained by bronchoscopy, thoracoscopy, puncture, or thoracotomy. In bronchiectasis, the principal signs are bronchorrhea and hemoptysis and the best procedure is contrast bronchography; deep roentgenography may suggest the presence of the disorder, but bronchoscopy should never be neglected. In chronic pulmonary and pleural suppurations, simple, deep, and contrast roentgenography and tomography, bronchoscopy, and laboratory examination are indicated. In pulmonary hydatids, laboratory and roentgen examinations make the diagnosis possible even in the absence of subjective and objective symptoms, hydatidoptysis, if present, is of great value. In pulmonary tuberculosis, the diagnosis must establish whether the lesion is open or closed, unilateral or bilateral, active or inactive, evolutive or non-evolutive, bacteriological examination is imperative, and is decisive when positive, the study of any form of the disorder requires the use of the various roentgen techniques, thoracoscopy, bronchography, pleurography, fistulography, bronchoscopy, and puncture. In actinomycosis of the thorax, laboratory examination is fundamental and roentgenography and tomography determine the site and extent of the fistulas and cavities. In pulmonary amebiasis, usually of the right lobe, roentgen and laboratory examinations are essential, sputum and material obtained by pulmonary or pleural puncture being used for the latter. In mediastinal tumor, tomography, artificial pneumothorax, and thoracoscopy serve to confirm the suspicion raised by a mediastinal syndrome or a roentgen shadow in this region, useful auxiliary procedures are opaque filling of the esophagus and the tracheobronchial tract with endoscopy of these organs when artificial pneumothorax cannot be instituted.

A large number of pictures illustrate the main points of the article

RICHARD KEVEL, M.D.

Calchi-Novati, G. Single Congenital Cyst of the Lung (Cisti unica congenita del polmone). *Radiol med*, 1940, 27: 556

Pulmonary cysts have been variously classified. Lanzo groups them under (1) those of bronchial origin, (2) those of alveolar origin, and (3) those stemming from the lymphatic system. Although, as is generally conceded, there are no pathognomonic signs of this lesion, yet in the majority of cases certain signs appear which are sufficient to serve as a basis for diagnosis. These are apt to be infectious or respiratory in character, the latter being associated with modifications of intrathoracic pressure and appearing in the first months of life. The cysts in these cases are often voluminous, and the clinical picture that of pneumothorax. The history is characterized by frequent respiratory infections followed by attacks of progressive dyspnea accompanied by marked



Fig

Fig 2

cyano s as ill as attacks f c g h g n th emi sion of tenaci us sputum showing more or less blood and indicating the commun cat on of the cy t with a bronchus and the rupt re of ne of the umerous ss ls of th w ll of the cy t Sudd n d ath is th freq ent outcome of such a cond tion Smaller cy ts on the other hand may escape notice during infancy and attract attent n only in later lfe when igns and symptoms of pulmo arv infection may appear This class of cases ha been well d scribed by c rta n French authors (Pruvost Leblanc Delort and C l esto) wh distinguish h the latent stage in which diagnos s re is solely upon rad ological evidenc the subsequent stage which may b complicated by hem pty i follo d in turn by the inf ctious stag associated by mod rate local reaction and ladi g f nally to abscess formation The whole clinical f c ture may be mild enough to suggest bronchitis or an arlv tuberc lous les on until the final stage of a all ng off produces the features of an encapsulated mpyema or a lung abscess of other origin A further form is sometm s found in conjunction with saccu lar bronchiecta s

The roentgenog am reveals a ci cular and well den ed rarefact on most often involving the lov r lobes partic laly the left In rare cases in wh ch o communicat on e sts with the bronchus th cyst may be filled w th fl d a d will be opaque or the presence of an infect us p ocess may be suggested by the l cal inflammatory action and a flu d level The ab enc of infection in the rest f the l ng field con titutes furth r evidenc upon which to ba e the diagno is of a cyst as d es the constancy or lack of p ogression of the lesion The appa ra ce of the pol cystic lung s to familar to rquire descript n A case i reported of fifty nin v ar old m le n hom a large cyst was fo nd

Excluding the balloon cysts of infancy i wh ch the differential diagnosi include ch fely pneumo tho ax ar d s l ct ng rather such l sions are s typ fied by the eported ca th entitie to be ul d out are chiefly the follo g ulcerative tuberculos; pulmo arv absces bronchiecta s e cap lat d empyema r pleural effu on echinococ us cyst

dermoid cy ts a d certain blastomycotic tumors Of th se the tube culous cav ty is perhaps the most diff cult to elim nate although the persiste lly neg ative put m the c mparative well b ng f tl pa ti nt th ab ence of other related path logy in the lu g a l the d l cately d l reated symmetrical ap p aranc of the les n on the ro g n gam are u ually suff ci nt to rul out f ch s infl ctio Again if abscess formation has tak n pl ce th pres nce f the underly g c ngenital l i n may be vev diff cult to e tabl h Here once more the large s ze as w ll as the ph rical shape w th m nimal peripheral inflammat on may rve to d d f rentiate the two p c tures hich may be ch ically identical

FDTRA F swo r i M D

Goldman A and Stephens H B Polypoid Bronchial Tumors *J Th acc S g* 194 347

I lypoid bronchial tumors grow as proj ctions with n the bronchial lum n and are usually visible through the br nechoscope Bronchial ad noma are one type of polypoid tumor which have an unusual form of gr wth A definite d tinction should be made between bronchial adenomas from carcinoma and other distantly metastatizing tumors Bro ch l ade omas a e p lypoid in fo m and are amenable to surg cal r mov l They compr e from 6 to o p r cent of all bronchial tumors and about 25 p r c nt of ll r sectabl bronch al tumors There ar 3 types met st izing p lypoid tumors (carci oma) locally nv i but n t d stantly m ta tasing pol p d tumors (aden ma) and n n va ve non metastatizing tumors (hb m lipoma my ma)

These auth rs r p t a r s f cases of bronchial ad noma of which 60 5 p r c nt occurred n wome wh le their own cases f bronchial carcinoma show d that only o j er cent ere occurng i women The prognosis for patie ts with ad n ma is ery good 83 5 p r c t of pat nts l d mor than th e years s while 5 per nt l ed mo than five years a d 33 3 per c nt lived m re than te year Th s mp toms and ch l cal course are as ociated w th wheez i g asthma irritating o pr ductiv cough dysp nea chest jai s ch ked up e sations and e spiratory p r al d comfort Lat r a becomes complet ly shut ff from th lveoli distal to the tumor and at l cta s re ult Wh n r is entrapped distal t the tum emphysema cc rs Th bronchial obstr ct on al i terf re v th drain ge f bronch al cr tions after which symptoms ppear wh ch nd cate p lmonary suppu ation Recurring p umona r so c lled dr wned lungs are sal o com o but empy ma absces and bronch cta sal o occur Wh n death occurs it ally re ults from uppu ation ec nd ry to the tumor or mor arely from c mpla cat on foll wi g t atm nt

The low g o th of these t m rs result i per m ne t chr nic inflammat y cha ges in the lu gs and ple ra Thu are prod ced chron c suppurat n and t em a which gi e t fatigue low g ad fe er chronic cough sputum pleuritic pain dysp

SURGERY OF THE THORAX

nea on slight exertion, anemia, anorexia, and all the symptoms usually associated with pulmonary tuberculosis. After many years an astonishing degree of resistance seems to be acquired so that the smouldering infection which may involve even an entire lung flares up less often and produces less disability.

The cardinal symptom of bronchial adenoma is the pulmonary hemorrhage. This hemorrhage is characteristically sudden in onset and termination, bright red in color, profuse even to the extent of producing shock, and unprovoked by cough or exertion. In women, frequently it occurs during the menstrual period. This hemorrhage probably arises from the tumor itself. There is a second type of hemorrhage associated with suppuration of the lungs and this is just as frequent as the former. This is composed of dark blood often clotted and mixed with pus, is induced by cough and exertion, and is followed by blood-streaked sputum for several days.

Roentgenologically characteristic lobar atelectasis is present. Emphysema and atelectasis are also present in varying degrees. There may be a marked shift of the mediastinum, thick pleurae, cystic whorls, and abscess cavities resulting from the suppuration. The tumor itself is demonstrated only occasionally.

Tomography will delimit the true morphology as well as the relation of the tumor to the surrounding structures and the extent of the extrabronchial portion of the tumor. Tomographic findings taken together with the bronchoscopic examination are of great aid in differentiating adenomas from carcinomas. An extrabronchial adenoma appears discrete, well demarcated, and smooth in outline, but a carcinoma usually shows a shadow blending with the opacity of inflammatory or atelectatic areas.

Bronchography is valuable in determining the level of the bronchial obstruction and the condition of the distal bronchi. The bronchoscopic image is that of a soft or firm mass or polyp, whitish, pink, or purple, and, if of long duration, indurated and hard. Bronchoscopic removal of the adenoma re-establishes the bronchial airway and brings about a dramatic and marked improvement in the patient, but late recurrences can be expected after such removal.

Histologically, bronchial adenomas are characterized by a uniformity of cell type and absence of mitotic figures and a tendency for the cells to be grouped. Covering the tumor is the mucosa. Beneath this there is the epithelial surface which is often highly vascular. Bone and cartilage are found frequently. Cells are often arranged in patterns of different designs. These designs may be columnar, alveolar, acinar, mosaic, medullary, and angiomatoid in pattern. The histological diagnosis of adenoma is not easy.

There are 3 types of treatment: local treatment, radiation, and pulmonary resection. Local treatment may be accomplished endoscopically or by local resection through a transpleural approach. The endoscopic treatment, the authors believe, is less commonly indicated than it was formerly thought to

be because of (1) local recurrences, (2) danger of fatal complications, (3) inability to remove adequate amounts of the tumor, and (4) disabling symptoms from the distal suppurating lung which still remain. Operation by the transpleural approach appears to be applicable to those tumors in which the distal lung has not yet been damaged permanently, in which the size is small, and in which dissection is easy. Radiation therapy probably has little effect upon the tumor itself. The authors state that intrabronchial irradiation has proved too cumbersome and the indications too indefinite. Pulmonary resection appears the ultimate fate awaiting most patients with bronchial adenoma. This is so not only because of the persistence of the tumor itself but also because of the continued presence of distal pulmonary suppuration.

J. DANIEL WILLEMS, M.D.

Ochsner, A., and DeBaKey, M. Carcinoma of the Lung. *Arch Surg*, 1941, 42: 209

On the basis of an extensive review of statistics, it is evident that pulmonary carcinoma is absolutely increasing and is becoming a significant problem in the treatment of cancer. A number of theories have been advanced to explain the increase in cancer of the lung. Because of the presence of metaplasia in the bronchial mucosa of persons dying from influenza, it has been suggested that this change is a precancerous lesion. On the other hand, many cases of carcinoma of the lung have no history of influenza. Other chronic specific and non-specific pulmonary infections have also been cited as playing possible etiologic roles in the production of pulmonary cancer. Of these, tuberculosis is probably the most frequently mentioned. This theory, too, has been refuted by reports emphasizing the rare occurrence of cancer and tuberculosis in the same person at necropsy. There is also insufficient evidence at present for considering syphilis of the lung a carcinogenic potentiality.

Of the non-specific chronic inflammatory pulmonary lesions, bronchiectasis and chronic bronchitis have been most frequently cited as possible etiologic factors in bronchiogenic carcinoma. Other possible etiologic factors include the inhalation of irritating gases (war gas, exhaust gas of combustion motors, and gases arising from tarred roads), the inhalation of radio active substances, occupational diseases such as pneumoconiosis and silicosis, and tobacco smoking.

The authors have the definite conviction that the increase in the incidence of pulmonary carcinoma is due largely to the increase in smoking, particularly cigarette smoking, which is universally associated with inhalation. Every one of their patients, with the exception of 2 women, was an excessive smoker.

Pulmonary carcinoma occurs principally in the male sex and, as might be expected, usually occurs in older persons. Most of the patients are between the ages of forty and seventy. However, the youngest patient whose case has been recorded is probably that of Weill-Halle and his associates, who reported

on a primary carcinoma of the lung in a child one year of age. Other patients under ten years of age have also been reported. The oldest patient was ninety-one years old.

At present it is generally accepted that all pulmonary neoplasms originate from the bronchial mucosa. As regards the location of primary neoplasms of the lung, the right side is involved more frequently than the left. Most pulmonary neoplasms are located centrally; that is, they are of hilar origin.

Based on the macroscopic or morphological appearance, there have been numerous classifications of lung carcinoma. Most frequently the classification used has been squamous-cell carcinoma, small cell or undifferentiated cell carcinoma (oat cell carcinoma) and endocarcinoma. However, the classification which seems most logical to the authors is that proposed by Halpert based on the development of the cells lining the bronchi and adequately explaining the histological structure of all primary pulmonary carcinomas. These malignant growths may therefore be classified into three types which depend on the embryological direction of growth: (1) reserve cell carcinoma (the reserve cells are the parent cells of the ciliated, cylindrical and goblet cells of the bronchial mucosa); (2) cylindrical cell carcinoma; and (3) squamous-cell carcinoma.

Metastases from primary malignant tumors of the lung extend as do those from malignant tumors elsewhere in three ways: (1) by direct extension; (2) through the lymphatics; and (3) through the blood stream. A fourth method of extension is bronchial embolism, described by Lumsden as surface spread. The authors believe this is an important method of extension and that it is responsible in many instances for the peripheral involvement of the lung in those cases in which the primary lesion originates proximally.

The most frequent sites of metastatic involvement are the regional lymph nodes and next in frequency the liver and the adrenal glands. Other sites of metastases are the bones, kidney, brain, heart and pericardium. Although the high incidences of metastasis reported in the literature would indicate that the surgical treatment of pulmonary neoplasm is relatively hopeless, it should be realized that these figures are based on autopsy cases in which the tumors obviously were advanced. The fact that in approximately 70 per cent of cases the metastases are limited to the regional lymph nodes makes the prognosis as regards the surgical treatment much better. The fact that metastases do occur most frequently in the regional lymph nodes is significant because in the surgical extirpation of a malignant lesion of the lung it is as important to remove the regional lymph nodes together with the primary focus as it is to do an alary dissection for lesion of the breast.

Unfortunately, there are no characteristic symptoms of bronchial carcinoma. The onset of the condition is usually insidious and the symptoms are disregarded because they are attributed to other

causes, particularly smoking. The most frequent symptom of bronchiogenic carcinoma is cough. In many cases there may be no thoracic symptoms, the complaints being of epigastric distress, anorexia, nausea and vomiting, malaise, loss of weight, constipation and aphasia.

Other thoracic symptoms may be present as evidences of an acute infection such as acute bronchitis or influenza. Hemoptysis is a relatively infrequent manifestation. Pain in the chest occurs relatively frequently and may be the earliest symptom of the more peripherally located lesions. Dyspnea as a rule occurs rather late in the disease. Pleurisy with effusion may be present in cases of peripherally located tumors with extension to the pleura.

The physical findings in cases of pulmonary malignant tumor are as positive as the symptoms and are dependent on the location and extent of the lesion and the consequent secondary pulmonary changes. The authors have frequently observed no physical changes in cases in which the diagnosis was made by roentgen and bronchoscopic evidence. In fact, the presence of obvious physical signs is generally indicative of inoperability.

The most important factor in the diagnosis of pulmonary carcinoma is the consideration of its possible presence. It should be suspected in the case of every patient forty years of age or older with cough, hemoptysis or thoracic discomfort.

The roentgen interpretation of centrally located lesions is generally difficult because of the confusion with hilar shadows produced by other lesions and by normal structures. This is particularly significant because most pulmonary neoplasms occur in the hilar region. In these cases bronchoscopic visualization of the tumor and biopsy of a specimen are of paramount importance as regards the accurate diagnosis. With peripherally located pulmonary malignant tumors, the roentgen diagnosis is dependent on shadows produced by the infiltrating tumor. With centrally located lesions after the condition has progressed to such an extent that bronchial obstruction occurs, atelectasis of one or more lobes develops which produces characteristic roentgen shadow and displacement of the mediastinal structures toward the affected side. Bronchoscopy is also a valuable diagnostic method, particularly advantageous in those cases in which the metastases do not cast a shadow. Roentgenogram taken after the intratracheal or intrabronchial injection of iodized poppyseed oil may demonstrate partial or complete occlusion of the bronchi. Finally, the presence of malignant cells in expectorated material can frequently be demonstrated microscopically. Aspiration biopsy is considered because of the danger of metastases occurring in the pleural space if the removal of the specimen.

At present it is the consensus of opinion that the only curative treatment of carcinoma of the lung is surgical extirpation. Numerous workers have observed that irradiation for carcinoma of the lung

SURGERY OF THE THORAX

ESOPHAGUS AND MEDIASTINUM

of little if any value. Although in a number of reported cases simple resection of the involved lobe has been performed, it is the opinion of the authors that any procedure short of total removal of the involved lung is irrational. Only by complete excision of the entire lung can the primary focus be adequately removed. Moreover, lobectomy obviously does not permit removal of the regional lymph nodes. From a technical standpoint, total pneumonectomy is considered a much better procedure, both surgically and anatomically, than lobectomy.

The authors advocate the use of pre-operatively staged pneumothorax and the transfusion of unmodified blood.

They use cyclopropane anesthesia, administered under positive pressure. The use of intratracheal tubes is considered to be deleterious, because of the likelihood of the introduction of infection and the increased secretion resulting from trauma. They believe that with few exceptions the anterior operative approach is not only adequate but preferable and they recommend resection of the third rib and its adjoining costal cartilage. Their operative technique is described in detail. In their series of 15 patients recovered and 8 (53 per cent) died. A series of collected cases from the literature is also reviewed. In a total of 100 cases, including the collected series and their own cases, 45 patients recovered and 64 (58 per cent) died.

SAMUEL H. KIPP, M.D.

Phillips, F. J., and Adams, W. F. Obliteration of the Pleural Space Following Pneumonectomy. *Ann. Surg.*, 1947, 113: 221.

Following removal of a whole lung there is an accumulation of a bloody, serous exudate in the pleural cavity and gradual absorption of the remaining air. The ribs on that side contract, the diaphragm rises, and there is a shift of the mediastinal structures to the operated side. The exudate gradually becomes organized into fibrous tissue if infection does not take place. The parietal pleura becomes much thickened and tends further to contract that side of the chest.

The authors report the autopsy findings in a patient who died of peritonitis of appendiceal origin nine months after an apparently successful left pneumonectomy for cancer of the lung.

The entire left chest cavity was lined with a well organized, dense, fibrous labyrinthine shell which contained a brownish, turbid sterile fluid. This shell varied from 0.5 to 2 cm in thickness. The right lung exhibited no gross evidence of emphysema. The heart was slightly enlarged and adherent to the fibrous tissue shell. The pericardial cavity was completely obliterated. There was moderate collapse of the left pleural cavity by contraction of the chest wall. The hilar lymph nodes contained carcinoma cells. There was no evidence of distant metastasis.

JULIAN A. MOORE, M.D.

Moersch, H. J. The Treatment of Esophageal Varices by the Injection of a Sclerosing Solution. *J. Thorac. Surg.*, 1947, 10: 300.

Many procedures have been advocated for the prevention and control of bleeding from esophageal varices. The surgical procedure that has been employed most frequently is splenectomy. However, it has not entirely solved the problem of gastrointestinal bleeding from esophageal varices. Pemberton and others have advocated omentopexy in addition to splenectomy with the thought of assisting in the establishment of an anastomosis between the portal and the systemic circulation, and thus diverting some of the blood that otherwise would pass through the esophageal varices. Ligation of the coronary vein as a possible method of preventing bleeding from esophageal varices has not proved to be entirely satisfactory although this procedure has been of benefit in certain cases.

Pemberton and the author became interested in the possibility of injecting a sclerosing solution into the veins directly through an esophagoscope. An attempt was made to produce varices of the esophagus in dogs, but these men were unable to produce enlargement of the veins in the esophagus. Consequently, the idea of employing the method in the human being remained very much in abeyance. The report of Crisford and Frenchner encouraged the author to attempt to duplicate their procedure.

The patient underwent esophagoscopy under local anesthesia, and markedly enlarged varices were readily found. They were of such size that they almost completely obstructed the lumen of the gullet. They formed large, bluish, nodular prominences which were soft and compressible. A suitable vein was selected for injection and, using a 25 caliber needle, 0.5 cc of a 2.5 per cent solution of sodium morrhuate was injected. The procedure was accomplished with practically no bleeding. Injections were carried out three more times, at four day intervals, 1 cc of the solution of 2.5 per cent sodium morrhuate being injected on each of these occasions. The change that took place following the injection treatment was very striking.

Sufficient time has not elapsed to determine the efficacy of the injection type of treatment of esophageal varices, and it may be found necessary to repeat the procedure if further bleeding should take place. It is still uncertain whether the injection should precede or follow splenectomy and ligation of the coronary vein.

MISCELLANEOUS

Rehn, E. Hyperfunction of the Thymus as a Disease. Preliminary Clinical Reports (Die Hyperfunktion des Thymus als Krankheit). *Deutsche med. Wochenschr.*, 1949, 1: 594.

Following the discovery of the thymus hormone by Bomskov, many questions have arisen. The

author limits his studies to hyperfunction of the thymus gland which he treats in a fragmentary manner

Thymus function which is important for cell regeneration may lead to death and disease if continued without proper control. When the glycogen mobilization necessary for growth oversteps its objective it may bring on diabetes in children and glycogen impoverishment in the liver. In addition to the development and hypersecretion antagonistic secretions of the endocrine glands the thyroid the gonads and the adrenals are suppressed—this occurs especially in times of great hormonal stress of the glands. In addition to the liver disturbances due to thyroid dysfunction as established in the Rehn Clinic there is also a thymus dysfunction that causes a glycogen impoverishment of the liver and of the heart and its actions and consequences are labile in the highest degree. As shown in the graphs of Hammar and Webeftitz which were made at various ages of rats the glycogen content of the liver and of the heart is very low shortly after birth and then it gradually increases. Since the antagonistic elements of the gonads do not function during childhood the uncontrolled progress of the status thymicolymphaticus is easily explained. In adults also there is a status thymicolymphaticus which can be shown by the appearance of lymphocytosis and leucocytosis when the thymus hormones are diminished in quantity. In such conditions the glycogen impoverishment of the liver and the heart also causes the lability occurring during the thymic circulatory activities. The functional productivity of the thymus is expressed by its hormone excretion in the urine this can be measured quantitatively by the method of Bomskov. The hyperplasia of the thymus in cases of Basedow's disease is a positively useful reaction as it produces a quieting and an arresting effect upon the thyroid secretion. The thymus irritation disappears if the patient is treated

with iodine he then becomes operable. When wrong treatment is given or following early exaggerated hypophyseal impulses the thyroid and the thymus may steadily increase their functional excesses and there may be such a disease producing activation that the thyroid will no longer respond to iodine treatment. The thymus controls the entire clinical picture with the highest degree of lability by producing glycogen impoverishment of the liver and of the heart. In such a case only the most cautious diminution of the thymic activity can produce the desired results. Myasthenia in Basedow's disease is not directly dependent upon the thymus but occurs in a round about manner following dysfunction of the adrenals. From now on besides the basal metabolism the part played by the thymus is to be established it is now possible to determine this before operation is undertaken.

Cancer patients facing dangerous operations in whom the author always found a hyperfunction of the thymus were treated successfully with a thyrotropic hormone of the anterior lobe of the hypophysis in that the thyroid function which had been reduced by the thymus was reactuated and this caused an improvement in the circulation of the blood and counteracted the toxicity. Similar results were obtained by radiation of the thymus. In lymphogranulomatosis the author found a thymus hyperfunction of such powerful output that despite the greatest scepticism directed against all attempts to establish its etiology he believes that the thymus participates most potently if not exclusively as the cause of Hodgkin's disease. The favorable results obtained in radiation of the mediastinum in Hodgkin's disease must be interpreted as being due to radiation of the thymus.

Roentgen radiation is to be preferred to operation in such cases. The author obtained favorable improvement in lymphogranulomatosis from roentgen treatment (BUETTNER) MATHIAS J. S. and T. M. D.

SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

Biggio G. Two Hundred Unselected Operations for Inguinal Hernia without Recurrence (200 operazioni d'ernia inguinale senza esclusione di casi e senza una recidiva). *Pubb. Roma*, 1910, 47 see p. 1105

The author reviews the operative results following his modification of Bassini's method of operating on inguinal hernia in 200 unselected cases seen from 1936 to 1939. The author's modification is the rectus muscle in his own variation of the procedure suggested by W. Scott and by Schley in 1913. The latter used the rectus muscle to strengthen the entire inguinal canal and transplanted the cord above it aponeurosis of the oblique muscle. Schley found it necessary to perform a slight protrusion along the cord in cases that the rectus muscle had not separated from Poupart's ligament.

In the author's series of 200 unselected cases there was no recurrence from six months to four years after operation. 2 of his patients had had a recurrence with previous surgery. In 1935 the author described his method in detail with appropriate illustrations. He makes an incision from the middle of the groin down to the root of the scrotum and exposes the inguinal canal. The cremaster muscle is dissected free from the cord. The hernial sac is exposed and opened, then ligated and pushed to one side. The cord is separated from the rest of the canal while the cremaster muscle is placed in the anterior part of the canal. The inferior fibers of the fascia of the internal oblique and transversus muscles are separated from the transversalis fascia. The lower fibers of the rectus muscle are exposed through the external aponeurosis. The transversalis fascia is then incised medially to the hernial sac, the base of which is now anchored medially in the internal oblique muscle. The peritoneum is sutured to the oblique muscle. The cremaster muscle is sutured to the base of the sac and the transversalis fascia sutured up to the exit of the spermatic cord. The cord is then elevated and the inguinal canal reinforced by the use of the muscle fibers of the rectus abdominis. The cremaster muscle is then replaced in the posterior part of the canal, and is fixed in position by catgut sutures to the anterior surface of the internal oblique muscle. Finally, the anterior part of the canal including the superficial fascia and the skin, is closed.

JACOB I. KATZ, M.D.

Levy, J. H., and Pund, E. R. Primary Sarcoma of the Omentum, Report of 2 Cases. *In J. Cancer*, 1940, 40: 219

Two cases of primary sarcoma of the omentum are added to the 84 cases which have previously been reported in the literature. One occurred in a white woman, aged twenty-nine, and the other in a

negro woman, aged twenty-six. In both these cases, and in many of the previously reported cases, the tumor apparently arose from vascular endothelium. The author concluded from histopathological studies that in the first case the tumor was of hemangio-endothelial origin and in the second of lymphangio-endothelial origin. All neoplasms of the omentum do not necessarily arise from the blood or lymph vessels. The fibrosarcoma may be an anaplastic regression of a benign fibroma. Many sarcomas undergo mucoid degeneration and this leads to the term myxosarcoma. More recently, Menni and Birge have propounded the theory that the majority of these sarcomas have their origin in the lipoblasts.

Sarcomas of the omentum have been classified into two groups, the circumscribed and the diffuse. Both of the authors' cases would fall into the first group, although in the first case the tumors were multiple. The soft consistency of these tumors denotes the cellular structure. They frequently attain tremendous proportions in a relatively short time. They infiltrate but generally appear well demarcated. It is not always easy to distinguish microscopically a tumor from an inflammatory reaction. It is generally recognized that inflammatory reactions in fatty tissue such as the omentum bear a close resemblance to sarcoma. On the other hand, masses which it was thought to be inflammatory have later been proved to be sarcomatous by recurrence and metastasis.

Preoperative diagnosis is difficult but the possibility of an omental tumor should be borne in mind in the presence of an abdominal mass.

The average age incidence of omental sarcoma is in the fourth decade although cases have been reported from early childhood to senescence. The ratio of females to males is 3 to 2. The onset is usually insidious, with bizarre abdominal symptoms. The tumor may, however, be found accidentally before symptoms arise. As a rule, there is vague abdominal discomfort with a dragging sensation. Occasionally there is an acute onset with severe abdominal pain, which has been attributed to rupture of one or several vessels with hemorrhage into the peritoneal cavity. Torsion may also produce an acute abdominal crisis with surgical shock, but this is infrequent. General malaise, anorexia, loss of weight, nausea, vomiting, constipation and sometimes diarrhea are the most frequent initial symptoms. Secondary anemia is commonly observed. Fever is an inconstant finding. Abdominal distention is present in more than half of the cases. This is due to ascites, which gradually becomes more pronounced, sometimes reaching tremendous proportions. The ascitic fluid is generally of a hemorrhagic nature. Pressure symptoms and partial intestinal obstruction may occur. A remarkable feature in many patients is the absence of cachexia even in a far advanced stage.

Physical examination reveals an abdominal tumor of variable size and contour in more than half of the patient. It is usually in the midline. In some instances it is mobile and can be pushed from side to side and upward although as a rule it cannot be moved downward. This serves to differentiate it from a primary pelvic tumor. The mass is usually not tender. It is generally little influenced by respiratory movements. When adhesions attach the tumor to some viscus or to the parietal peritoneum its identification as such is made more difficult. Only 3 cases have been reported in which the diagnosis was made preoperatively.

The high incidence of recurrence may be due to the mobility of the omentum which facilitates early implantation. Operative trauma may play an important rôle in distributing implants. Gastric ulcers developed in a number of cases after resection of the greater omentum. This has been explained on a basis of interference with the blood supply.

In view of the early recurrences the high postoperative mortality and the small percentage of doubtful cures following operation, excision of these tumors is of little benefit. X-ray therapy should if possible be tried before operative extirpation.

JOSEPH K. NARAT, M.D.

GASTRO INTESTINAL TRACT

Link, K. H. Small Hemorrhages in the Gastro Intestinal Tract with Special Reference to Their Relation to Pseudomelanosis (Ubrklea Blutgenidn. Magen-Darmkanalutriebes adre. Bruckschubig. Berl. h. g. n. Pseudomelanose). *Chirurgia* 194 306 61.

Opinions regarding the origin of pseudomelanosis which condition is often found in autopsies are not yet uniform. From 214 observations the author believes that a definite relation can be established between pseudomelanosis and small hemorrhages of the gastrointestinal tract. In the research the author found that on account of the many forms of disease which lead to bleeding in the gastrointestinal tract the chemiopathological findings of the occult blood must not be overemphasized. The finding of a small amount of blood or of its derivatives in the feces is only a contributory sign of the disease which is of use only in combination with a carefully taken history and an extensive general physical examination for the diagnosis of the disease. Small hemorrhages were found in the following diseases of the digestive tract especially in the stomach pathologic processes of the intestinal wall such as leuc abdominal typhoid paratyphoid B dysentery carcinoma of the stomach and large and small intestine chronic indurated stomach and duodenal ulcers hemorrhagic erosion of the stomach polyps in the stomach or large intestine pressure and splitting ulcers of the large and small intestines ulceration of intestinal tuberculosis and intestinal hernia as well as in metastatic breast carcinoma and in

deciduoma malignum. In addition hemorrhages are also found in the gastro intestinal tract in disease which lies outside of this tract for instance carcinoma of the peritoneum pancreatic carcinoma gall bladder carcinoma cholecystitis carcinoma of the uterus acute yellow atrophy of the liver inflammatory conditions of the kidneys and malignant tumors as well as nodular hyperplasia of the prostate. Finally hemorrhages in the gastrointestinal tract are also produced by such diseases as lymphatic leucemia and pernicious anemia also by burns.

Pseudomelanosis of the gastrointestinal mucosa membrane which has been observed in many diseases and diseases which produce small hemorrhages in the gastrointestinal tract are not only responsible for moderate external signs but also have a internal casual connection. The pseudomelanin is composed of an inorganic or organic combined iron and a sulfurous constituent. One must assume that the iron containing constituent of the melanin arises in all of these cases from hemoglobin which is produced in the lumen of the intestine. However one cannot be sure of the origin of the blood from these observations. Three possibilities exist: the blood in occult form passes off in the usual manner the plasma of the blood that is absorbed from the cells contains hemoglobin or there may be a combination of these two possibilities. The source of the sulfurous component of the pseudomelanin is probably explained by the hydrogen sulfide in the intestinal gas. One may also conclude that pseudomelanosis arises if ionized iron or intra erythrocytic or extra erythrocytic hemoglobin (hemoferin) combines with hydrogen sulfide.

(KLAUS W. SMUTH) RICHARD J. B. NETT, J. M.D.

Taylor, H. Practical Evaluation of Gastroscopy. Carcinoma Gastric pyloric Dyspepsia Mucosal Types Gastrojejunal Ulcer. *Lancet* 194 24 131.

This report from the London Hospital concerns the results of an analysis of 35 cases of dyspepsia in which gastroscopy was resorted to after other investigations were carried out for the purpose of diagnosis. Examinations were made of 32 normal stomachs, 112 stomachs with local lesions, 84 with diffuse lesions, and 99 which had undergone gastrointestinal anastomosis. In 26 instances failure of examination were reported. In the 12 biopsied and 14 partial failures the common site of use of the failure was distortion of the upper end of the stomach due to a lesion high up on the lesser curve. An inflammatory mass here may prevent the instrument from negotiating the leftward curve of the esophagus as it passes through the diaphragm or may produce a contraction band across the posterior wall of the upper part of the stomach.

A malignant growth was observed in 34 cases. In 6 the presence of the lesion was known and gastroscopy was carried out to determine its operability. In 28 instances the examination was made to establish the diagnosis. It was an unexpected finding in 14 instances. In another 14 instances it was sus-

SURGERY OF THE ABDOMEN

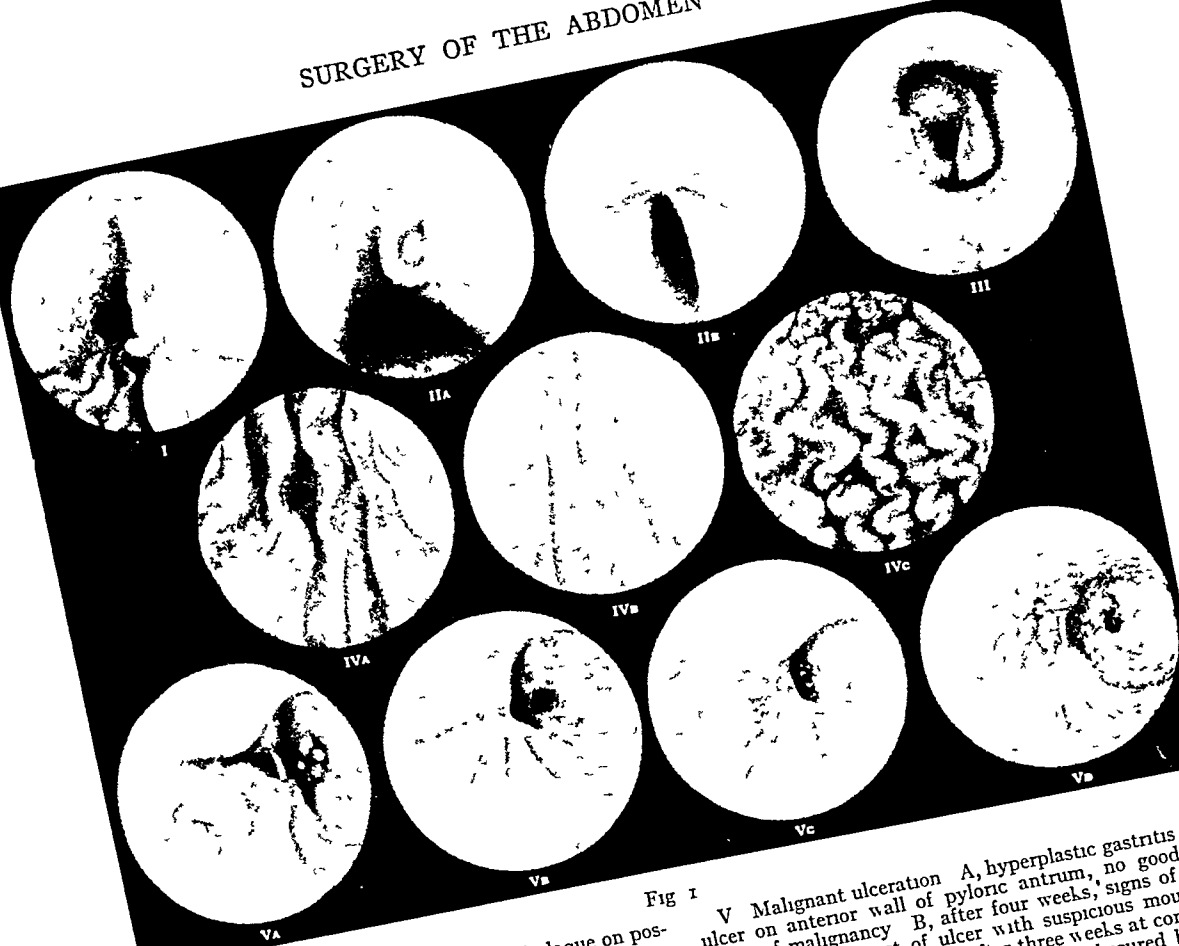


Fig 1

- I Early carcinoma Nodular congested plaque on posterior wall
- II Healing peptic ulcer A, at first examination, B, after three weeks of medical treatment
- III Impending hematemeses in chronic ulcer with acute erosion on its anterior margin
- IV Mucosal types A, normal, B, hypoplastic, C, hyperplastic
- V Malignant ulceration A, hyperplastic gastritis with ulcer on anterior wall of pyloric antrum, no good evidence of malignancy B, after four weeks, signs of healing in proximal part of ulcer with suspicious mound of mucosa on further edge C, after three weeks at convalescent home, little change, base of ulcer obscured by fine froth D, six months after first examination, undoubted malignant change

pected but was not confirmed by other methods of examination. In 68 cases in which carcinoma was suspected the lesion was definitely excluded. In this group 25 exploratory operations which would have been indicated on the basis of other methods of examination were avoided because of the negative findings. In 293 cases of carcinoma diagnosed without gastroscopy, 51 resections were possible (17 per cent). In the 28 cases diagnosed by gastroscopy 19 were resected (68 per cent). The value of an early diagnosis is clearly indicated. Repeat examinations are also of value in differentiating ulcer from carcinoma. A supposed benign lesion proved to be malignant in 8 cases, while in 14 other cases benign lesions were established when other examinations indicated the presence of a malignant lesion. The usual test meals and therapeutic tests are frequently misleading since acid is present in two-thirds of the

early cases of carcinoma and may be increased in amount in some. Frequently, carcinoma develops in a stomach which is the seat of gastritis. A therapeutic test may be followed by relief from the symptoms but the malignant lesion will continue to grow. Gastroscopy obviates consideration of the dubious findings of the test meal or the therapeutic test. In dyspepsia gastroscopy is advisable when constant recurrence of the symptoms or incomplete relief from them suggests that a more exact investigation than roentgenography or a test meal is needed. In 32 instances the stomach was discovered to be normal in spite of the gastric symptoms and a complete reorientation of the case was necessary. The examination may reveal an unsuspected ulcer, the presence of antral spasm, or perhaps a diverticulum, conditions which lead to essential modification of the treatment. With gastroscopic control in ulcer cases,

both patient and clinician are encouraged to persist with treatment until the crater has gone and the distortion of the scar has subsided. Impending hematemesis from an ulcer may reveal itself by the visible extravasation of blood through the softened wall of an artery lying beneath it. This process seems to continue for some time before the vessel itself gives way and the seepage results in a low velvety cushion-shaped pinkish mound in the yellow base of the ulcer.

Gastroscopic evidence has lent increasing support to Hurst's view that people tend (probably from birth) to have gastric mucosae of different types—normal or average hyperplastic and hypoplastic. An atrophic mucosa must be considered an acquired pathological condition in itself associated with definite derangement of function. Hyperplastic and hypoplastic states appear to be physiological variants from the standard and are not essentially associated with disturbance of function. They are however particularly susceptible to gastric disease. 75 per cent of the patients had one or another of these types of gastric mucous membrane although Hurst suggests a general incidence of 20 per cent. By watching the progress of treatment gastroscopically it appears that while the superadded gastric disease can be cured or mitigated the type of mucosa remains unaffected at least over a considerable period. The height of the gastric acidity and the degree of development of the mucosa correspond but the amount of variation in the acid secret on in patients with similar mucosae is considerable. While hyperacidity is associated in general with hyperplasia and hypoacidity with hypoplasia and gastritis individual cases vary through such a wide range that the acidity is not a reliable indication of either the type or condition of the gastric mucosa. Gastric ulcers tend to arise more often in hyperplastic stomachs but many occur in the presence of normal mucosa. Gastritis was present in all cases of active ulceration and it seems that although an increased acidity increases the tendency of an inflamed mucosa to break down a normal or even subnormal acidity may digest a mucosa in which resistance has been depressed by chronic inflammation.

Duodenal ulcers appear to be invariably associated with a hyperplastic mucosa—usually of a more marked degree than in gastric ulcer and so much so that absence of hyperplasia in the gastric mucous membrane is strong evidence against duodenal ulceration. By taking into account the degree of hyperplasia of the mucosa as well as the extent of scarring and distortion around an ulcer the gastroscopist can give a good opinion as to the prognosis and treatment of the case.

The severest form of hyperplastic gastritis found in patients with persisting or recurring symptoms after gastroenterostomy is for peptic (usually duodenal) ulcer. The worst cases are those which have progressed to anastomotic ulceration. The type of mucosa tends to remain constant for the individual and the hyperplasia at least must have

existed before the original ulcer for which the anastomosis was made. Such a mucosa is inevitably subject to recurrent attacks of gastritis both before and after the operation which result in duodenal and anastomotic ulcers respectively. The pathology is basically the same in each case and there is no evidence of different origins for the earlier and later phases of an essentially continuous process. The stoma has been incriminated on the grounds that the hyperplastic gastritis is severe and localized to the region of the opening. A posterior gastroenterostomy opening is placed at the site of greatest anatomical rugosity—the greater curve and posterior wall. Hyperplastic gastritis appears prominent here but it is important to distinguish between the hyperplasia (the rugosity) and the inflammatory changes. In 86 patients with symptoms after gastroenterostomy mostly for duodenal ulcer none had any special concentration of inflammation of the gastric mucosa toward the stoma except at the suture line itself or near an established ulcer. Of the cases with original ulcer only those with the greatest mucosal hyperplasia would be likely to go on having symptoms in spite of the gastroenterostomy; the milder cases would be cured by it. In each of 3 control cases which were symptomless for some years after gastroenterostomy for established duodenal ulcer the hyperplasia was only moderate and none showed any evidence of gastritis in spite of the stoma. It appears that the operation of gastroenterostomy which can be relied on to cure a duodenal ulcer is safe from the complication of gastrojejunal ulcer only if the degree of hyperplasia in the gastric mucosa is not excessive. Partial gastrectomy should be done in patients with severe hyperplasia.

In the 86 cases of gastroenterostomy with persistent symptoms diffuse hyperplastic gastritis without ulceration was the most frequent finding but local lesions included 3 carcinomas, 9 ulcers of the lesser curve and 15 gastrojejunal ulcers, 4 of the latter were not directly observed but the presence was inferred from a localized area of severe nodular gastritis at one part of the stomal ring which obscured the crater itself. Partial gastrectomy had been performed in 3 patients with postoperative symptoms and 6 of these had a jejunal or gastrojejunal ulcer. These figures rebut the contention that recurrent ulceration does not follow this operation.

The author concludes that the gastroscopist introduces anatomical and pathological exactness into the study of dyspepsia. Its wider application may produce a substantial decrease in mortality from carcinoma of the stomach and morbidity from gastritis and peptic ulceration.

M. VULE E. L. CHET ST. P. M. D.

Seebrennikoff L. V. and Shchukoff V. P. Experimental Study on Palliative Operation for Perforated Peptic Ulcers. *Ann. Surg.* 94: 47-59.

Omentum is extensively used for the reinforcement of sutures in the closure of perforated peptic

ulcers, but is not suitable for occlusion of the perforation itself as it easily succumbs to infection and also frequently undergoes cicatricial degeneration, because of a poor blood supply following suture.

In search of a more suitable material, the author formulated the following requirements: the tissue used for occlusion of the perforation must be sufficiently resistant to infection, must not become entirely transformed into a non-elastic scar, and must allow the development of sufficient vascularization. It occurred to the author that pedunculated sero-muscular flaps obtained from the gastric wall meet such requirements. In experiments on dogs he found that excision of the ulcer is essential because it removes the focus of infection and creates better conditions for healing. The flap was turned outside in, i.e., the serous surface was attached with catgut sutures to the surrounding mucosa while the muscular layer of the flap was united with the corresponding layer surrounding the perforation. Forty-five days after the operation a complete regeneration of the mucosa within the area of the former perforation was found. The submucosa also was present forty-five days after the transplantation. Apparently the development of the submucosa was due to a metaplasia of the serous epithelium into connective tissue. The muscular layer preserved its vitality.

JOSEPH K. NARAT, M.D.

Glenn, P. M. Intestinal Obstruction, Results of Treatment with the Use of Intestinal Intubation. *Am J Digest Dis*, 1941, 8: 35

The author has reviewed a series of cases of intestinal obstruction for the four years preceding July, 1938, and has compared the mortality with that for the period from July, 1938, to April, 1940 (Table I).

TABLE I—MORTALITY RATES IN CASES OF INTESTINAL OBSTRUCTION IN THE STUDIED PERIODS

	No of Cases	No of Deaths
July 1934, to July, 1938	49	20 (40.8%)
July, 1938 to April, 1940	67	16 (23.8%)
Not intubated	15	9 (60.0%)
Intubated	52	7 (13.4%)

Of course, there are differences in the groups which it is impossible to evaluate. In regard to treatment, however, the chief difference has been the use of the Miller-Abbott tube in most of the second group. However, with the passing years more meticulous attention has been given to correction of fluid and electrolyte disturbances, which undoubtedly also contributed to the decreased mortality.

In the author's experience, the most gratifying results are obtained in postoperative cases complicated by peritonitis and obstruction. In pure paralytic ileus, decompression in the intestinal tube is the only uniformly reliable therapeutic measure (Table II).

TABLE II—MORTALITY RATES IN CASES OF INTESTINAL ILEUS IN WHICH INTESTINAL INTUBATION WAS UTILIZED

Type of ileus	No of Cases	No of Deaths
1. Paralytic (neurogenic) ileus	3	0 (0%)
2. Postoperative ileus	14	1 (7.1%)
3. a. Mechanical obstruction (non-neoplastic)	27	3 (11.1%)
b. Mechanical obstruction (neoplastic)	8	3 (37.5%)
Total	52	7 (13.4%)

Good results are also obtained in all other types of obstruction. The use of the tube is indicated in any case with small intestinal distention except when there is interference with the blood supply of the intestine, or external hernias are present. It is particularly useful in obstructions of a subacute or chronic nature, which in the author's experience were present in about two-thirds of the cases admitted with obstruction.

In cases in which the obstruction is caused by a self-limiting disease, such as an inflammatory process, intestinal intubation can sometimes obviate a surgical procedure.

Colonic obstructions usually present the greatest difficulty and yield the poorest results from intestinal intubation.

Interference with the blood supply of the intestine remains a surgical emergency and contraindicates any delay of intubation. It must be remembered that strangulation may occur during the course of intubation and one must always be on the alert for this complication.

SAMUEL H. KLEIN, M.D.

Erba, L. Intussusception of the Colon (Invaginazione colo-colica acuta nel bambino). *Radiol med*, 1940, 27: 623

The author reviews the literature on intussusception of the colon and adds 1 to the few reported cases.

The subject was an eighteen-month-old male infant who manifested severe abdominal pain, nausea, vomiting, and a palpable tumefaction in the left upper quadrant. By means of a barium enema a segment of the transverse colon about 4 cm. in length which filled with difficulty and revealed the radiological features of intussusception was discovered.

The invagination was reduced by the opaque medium which was administered under increasing pressure.

EDITH FARNSWORTH, M.D.

Wood, G. O. Resection of the Colon by Intussusception. A One-Stage Interiorization Procedure Resulting in an End-to-End Anastomosis. *Arch Surg*, 1941, 42: 508

The author produces an intra-intestinal interiorization of diseased bowel into the lumen of the distal bowel and a slough of the interiorized portion as a

result of artificial ischemia. This implies that the operation is limited to lesions that can easily be intussuscepted into the bowel distal to them. Naturally only small tumors, pre-fibrotic ulcerative colitis, diverticulosis and multiple polyposis are amenable to this treatment. Sixteen dogs were operated upon by Wood with no early postoperative deaths and convalescence was uneventful in every instance. The success of the operation depends on:

1. Avoidance of strangulation. This is accomplished by removal of the mesocolon from the bowel to be invaginated.

2. Prevention of intestinal obstruction and postoperative distention of the bowel proximal to the intussusception.

3. Using a method by which intussusception can be readily produced. Both (2) and (3) are taken care of by the use of an indwelling hard rubber suction tube about 1 cm. in diameter.

4. Delay of amputation of the intussusception. This is done by means of a ligature placed to cut off its blood supply when and where desired.

The pre-operative essentials are:

1. Thorough cleaning of the bowel distal to the segment to be resected.

2. The hard rubber tube should have narrow rolls of adhesive tape placed as shown in Figure.

The ileocecal region of the dog was chosen because it would seem to offer such difficulties as would probably be encountered in man.

The abdomen is incised according to the indications. The segment of bowel to be removed is mobilized and its mesentery excised. This eliminates most of the dangers of strangulation, intestinal ob-

struction and the surgical shock that might follow if denervation and devascularization had not been done before the intussusception was undertaken. An assistant passes the tube per rectum until the operator feels it near the peritoneal reflection of the rectum. The operator then directs the passage of the tube up through the segment to be resected far enough until the two larger rolls of adhesive tape will be from 2 to 3 cm. proximal to the center of that segment. This permits doubling of the intussusception after the application of the necrotizing ligature. Umbilical tape or a broad ligature is placed between the two larger rolls of adhesive tape for the purpose of producing friction but not drawn tight enough to diminish the lumen of the tube.

After the bowel has been anchored to the tube the operator produces downward traction at its distal end while an assistant simultaneously applies similar efforts at the protruding anal end of the tube. The intussusception should be increased until its base is from 1.5 to 2 cm. from the mesenteric borders. This will leave sufficient viable bowel above the base of the intussusception for completion of the anastomosis.

Umbilical tape is then tied about the base of the intussusception to maintain it and to serve as a fixed apex for the second intussusception. The tape should be placed so that the smallest possible lip of the intussusciens is proximal to it. This will facilitate the next step—doubling the intussusception or reintussuscepting the bowel. A rubber band is then tied snugly around the base of the intussusception to aid in the production of necrosis and thus amputation is effected through all the layers of the intussusceptum. Crushing clamps must be avoided.

Next, further traction is applied to the rectal tube while the surgeon grasps the bowel and aids in the production of another very short intussusception over the two ligatures at the base of the first intussusception, i.e., a double intussusception results with the apex of the second short viable intussusceptum pointing into the healthy part of the proximal bowel.

The mesenteric defect is then repaired and interrupted submucosal sutures are placed between the bowel above and the intussusciens below. One of these sutures is left long so that it may later be pulled through an opening made in the omentum and then be sewed to the parietal peritoneum to forestall any further intussusception. A second row of anastomotic suture is placed around the circumference of the bowel. Silk sutures are most satisfactory.

The abdomen is closed and excess rubber tubing protruding from the rectum is removed. When necrosis is complete the tube and the intussusceptum will pass via the rectum.

This method of colonic resection and end-to-end anastomosis combines all advantages of the usual external abdominal externalization procedure plus the elimination of exposure to postoperative leakage and infections due to fecal contamination.

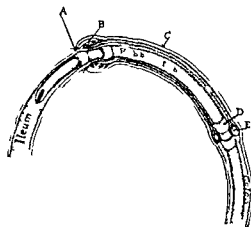


Fig. 1. Diagram of longitudinal section through the completed anastomosis. A, serosal protruding; B, necrotizing ligatures which will produce necrosis of the shaded intussusceptum (B to C); C, the intussusceptus; D, rolls of adhesive tape on the indwelling rubber tube which serve to hold the intussusceptum in place; E, initial intussusception, ligature.

SURGERY OF THE ABDOMEN

sufficiency of 8 per cent and pneumonia 5.0 per cent. Other conditions which were responsible for death were embolic phenomena, nephritis and uremia, and the complications of fecal fistula, diabetes mellitus, diverticulitis, and gangrene of the omentum in incarcerated hernia. LOUIS W. GIBBS, M.D.

LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

Bernhard, I. The Present Status of Surgery of the Biliary Tract (Der neueste Stand der Gallenwegschirurgie). *Chirurg*, 1920, 12: 3, 4.

Bernhard has defined the status of surgery of the biliary tract in an exceptionally clear fashion on the basis of the prolific material from his clinic (6,370 cases). He believes that cholecystostomy has been unjustly forced into the background by cholecystectomy for a long time. In severe general conditions and in advanced age, however, it has maintained its rightful place. In contrast to removal of the gall bladder, it is an emergency operation, which is most commonly encountered, one can no longer speak of function of the remaining gall bladder mucosa, this has been proved by cholecystographic investigations.

Two complications of cholecystostomy can be avoided: (1) dense adhesions between the liver and abdominal wall, by means of the water-tight suture of the gall bladder opening to the interior abdominal wall, and (2) mucous fistula which occurs when stones are overlooked in the gall bladder neck or cystic duct. The latter may be avoided if one satisfies himself at operation that free flow takes place from the cystic duct into the gall bladder. Further, cholecystostomy is recommended in severe hepatogenic icterus, in which condition it occasionally saves lives. The author disputes Geissendorfer's contention that in empyema of the gall bladder, cholecystostomy should be done first and cholecystectomy should be undertaken later. Likewise, he is opposed to a two stage plan of action for stone in the common duct since the secondary operation will be necessary in from 10 to 20 per cent of the patients. At the Giesen Clinic it has been necessary in 12.5 per cent. In contrast thereto, cholecystectomy has required secondary operation in only about 1.5 per cent of the patients.

In regard to cholecystectomy the author holds that it is unimportant whether the gall bladder is removed from the cystic end outward or from the fundus inward. Concerning the question of removal during the acute stage or during quiescence, Trendelenburg and Hotz had a mortality of 13.1 per cent during the former and 6.8 per cent during the latter period. Bernhard advocates delay. Very frequently involvement of the pancreas is responsible for the severity of the clinical picture, which may be proved by determination of the urinary diastase. This is necessary in all cases, during the acute attack as well as in cases in which indications for operation are un-

Nassau, C. F. Lorry, R. W., and Pulaski, E. J. Treatment of Appendicitis at Frankford Hospital. A Thirty-Six-Year Survey of 4,650 Cases. *Ann. Surg.*, 1921, 42: 205.

This paper is the report of a study of all patients admitted to the hospital from 1904 to 1930 with a primary diagnosis of appendicitis who were operated upon primarily or who died without operation. A McBurney incision was made in the cases of the men and children and a right rectus incision in the women. The appendix was removed in all cases unless there was abscess formation or peritonitis, in which cases removal might necessitate undue trauma and spread of infection. When frank pus was found, the wound was left open without suturing and a dressed drain was placed into the bottom of the pelvis. Postoperative care included thoughtful use of Wangenstein suction, intravenous infusions, transfusions, and small doses of morphine.

The mortality rate for the entire group was 3.27 per cent and was found to be higher in the male group than in the female because of the greater incidence of complicated forms of appendicitis in the former.

All cases were classified pathologically into one of five groups: acute catarrhal appendicitis, acute gangrenous appendicitis, acute appendicitis with perforation, acute appendicitis with perforation and abscess formation, and chronic appendicitis. The more advanced forms of the disease were encountered in 35.8 per cent of the patients.

The authors found a general decline in the mortality rate during the period of the last five years in all types of the disease except appendiceal abscess. The operative mortality in the cases of 1,800 patients with acute catarrhal appendicitis and 1,100 patients with chronic appendicitis was 0.44 and 0.59 per cent, respectively. The mortality rate in 1,159 cases of gangrenous appendicitis was 3.5 per cent, although there were no deaths during the last five years in 338 cases. An appendiceal abscess was found in 135 cases. Although 12 of the patients died, no operation was done on 3 of them. The operative mortality rate was 6.6 per cent. There were 356 cases of acute appendicitis with perforation and peritonitis, 84 of which were fatal, however, 21 of the patients had no operation, which makes the operative mortality rate 17.6 per cent.

General peritonitis was the cause of death in 59.8 per cent of the fatal cases. Intestinal obstruction caused 12.5 per cent of the deaths, myocardial in-

certain. This determination is also necessary in order to decide upon opening of the common duct since the diastase value is elevated in half of the cases of stone in the common duct. Following operation daily diastase determinations should be made because sometimes otherwise inexplicable conditions may thereby be understood. The Giessen Clinic delays intervention in acute inflammatory conditions and the author has never observed perforation or complications as a result. Daily leucocyte counts are necessary. On the other hand the sedimentation rate gives little information during the first few days. Only later persistence of accelerated sedimentation is an indication for operation. Delayed management requires the withholding of food and fluids by mouth for one or two and possibly for three days. Fluids are given per rectum and heat is applied.

In regard to disturbances of motility Bernhard acknowledges the hypertonic gall bladder stasis with a hypertrophied sphincter at the bladder neck (vagus) and the hypotonic (sympathetic) type of Westphal. Both can produce typical gall bladder colic and even pancreatic necrosis. With an associated higher opening of the duct of Wirsung into the choledochus pancreatic juice may flow into the common duct. These are the cases in which one finds nothing at operation. The riddle can be solved by examination of the gall bladder bile which contains diastase. This also explains the origin of biliary peritonitis with undemonstrable perforation. In such cases the gall bladder should be removed. The dyskinesia leads further to a discussion of the stippled gall bladder which according to Westphal originates because of hypertonic gall bladder stasis. Aschoff denotes this. In thirty years 443 cases frequently associated with jaundice were counted at the clinic. Adhesions were usually present and the pancreas was covered in 70 instances. The diagnosis is difficult. For the most part the complaints were those of gall stone disease but with negative cholecystogram. Tests of pancreatic function are decisive. At operation one often sees nothing except adhesions. Sometimes the gall bladder has lost its color. Occasionally stopping is visible or can be ascertained by rubbing over a fold of the gall bladder wall. Permanent results are somewhat poorer than after removal of the gall bladder altered by inflammation and for this reason the indication must be more rigidly established than in gall stone disease. Successful conservative management is impossible. Bernhard regards Pribram fulguration of the mucosa as worthless.

The mortality at the Giessen Clinic following intervention in 667 patients was 5.4 per cent. This included both the most serious cases and cases of tumor. After cholecystectomy alone it amounted to 3.5 per cent. Peritonitis hardly played a rôle but heart and lung complications were significant. Improvements can be obtained through the employment of local anesthesia which can even be carried to the point of opening the common duct. External palpation

of the choledochus does not reveal whether the duct contains stones. Kirschner and Nordmann consider it necessary to open the duct in order to determine this. Bernhard believes this is superfluous and in the seriously ill a dubious procedure.

Röntgenologic visualization of the biliary tract from the cystic duct onward during the operation provides a certain measure of information. Before entering into particulars of Mircz cholangiography the author discusses incision of the common duct. After this there are three possibilities: (1) common duct drainage, (2) closure by suture or possibly dilatation of the papilla, and (3) the performance of an anastomosis with the duodenum.

In using drainage one will never be able to dispense with the Kersch tube or the Nelaton catheter. The effect of prolonged loss of bile in the older patient has always been underestimated. At most 50 c.c. of bile can be replaced through repeated daily infusions. Heavy loss of bile brings about comatose states which can be spectacularly improved by blood transfusion.

In regard to closure of the duct this procedure is entirely justified with a widely patent papilla and a good biliary flow. Dilatation of the papilla has had no recognition. However suturing the duct harbors the danger of bile leakage and biliary peritonitis as a result of which the clinic has lost several patients. Nevertheless the dangers of bile loss in patients over fifty years of age are greater than the danger of biliary peritonitis. When the condition of the papilla is not without objection and the passage through the lower choledochus is not satisfactory Bernhard performs choledochoduodenostomy. This merits a broader application. With an external biliary fistula one should never omit a contrast visualization of the biliary tract. Gall stones reveal themselves as filling defects. One should make use of this expedient only after cholecystectomy but also after drainage of the common duct. The author recommends cholangiography from eight to twelve days after operation. If the contrast material passes into the duodenum with ease drainage is not necessary and in cases in which the drainage is ordinarily left in place for eighteen days it may possibly be removed one week earlier. Ether instillation for the dissolving of stones as advocated by Pribram is advised against because it causes severe irritation. Beautiful pictures are obtained by cholangiography during operation with Kirschner's spinal anesthesia and local infiltration. Attempt made with spinal anesthesia during operation at the clinic gave no gratifying results. Ether after removal of the gall bladder, perabrodil or uroselectan was injected into the biliary tract through the cystic duct under local anesthesia. The cassette was under the patient and a portable roentgen screen was used. By this means the indication for a further operative procedure after cholecystectomy could be ascertained. If narrowing of the common duct as a result of chronic pancreatitis or stenosis of the papilla presents itself choledochoduodenostomy is performed. The examination

causes delay and one should therefore employ it only in doubtful cases, but with technical improvements one can reduce the length of time required. The best films are obtained with local anesthesia and with the patient holding his breath, but one can also obtain valuable evidence which will show whether further operative procedure is necessary with general anesthesia. Up to this time 47 cholecystoduodenostomies and 17 cholecystogastrostomies have been performed at the clinic. Differences in the late results are not apparent. However, the author prefers the former for it produces physiological conditions, and retrograde filling of the gall bladder with food particles, which leads to inflammation and stones, does not occur so easily. A short-circuiting operation between the gall bladder and stomach is considered only if an irremovable obstacle is the cause of biliary obstruction, and the choledochus, because of stenosis, is unsuitable for anastomosis, or if cholecystectomy with added revision of the common duct cannot be tolerated in a severely ill and icteric patient.

In general one should make a practice of removing the gall bladder as the seat of stone formation in gall stone disease and employ choledochoduodenostomy for establishing an internal biliary fistula. In contrast, the gall bladder is preferably employed in cancer of the common duct or pancreas since the tumor involves the internal bile fistula later. It is often difficult to determine at operation whether cancer or a chronic inflammatory process is present. In this respect, also, roentgen studies are helpful, especially in determining the prognosis after operation by a comparison of two films taken with a time interval between.

Ascending inflammation and fatal cholangitis following choledochoduodenostomy has been too much feared. The danger is overestimated. Investigation at the clinic showed that choledochoduodenostomy in 50 cases led only 3 times to a fatal cholangitis. In these, however, it had been done as a palliative procedure, for at the time of the first operation the established inflammation was beyond remedy. This unfortunate result cannot be attributed to choledochoduodenostomy as such. Cholangitic symptoms also occur after choledochoduodenostomy for tumors. Regurgitation of contrast media into the biliary tract has occasioned rejection of choledochoduodenostomy. This occurs, however, only when the biliary tract is dilated as a result of long standing gall-stone disease and secondary inflammation, and further when the first operation has furnished inadequate correction of the situation. The author has seen the dilated biliary duct following choledochoduodenostomy gradually become smaller and narrower again in the course of time. In any event this operation is very efficient in cholelithiasis and not solely an operation of necessity. In 66 cases the mortality was only 15 per cent. For contrast there was a 99 per cent mortality in 1,000 choledochostomies. The former operation appears to be indicated even in the most severe and, to a degree, in desolate cases. In frank jaundice blood transfusion

is second only to direct exposure of the skin to the sun's rays for the production of Vitamin D. If possible, ether anesthesia should not be used because of its effect on the liver. After operation continuous intravenous infusions of fluids are made and the patient is gotten up after three or four days. Bernhard always makes a supraduodenal anastomosis, a longitudinal incision in the choledochus, and a transverse cut in the duodenum placed not so high that too long a segment of choledochus is excluded from the circuit. Since the employment of preliminary blood transfusion and local anesthesia the author has not seen cholemic bleeding. The hope which had been placed on Vitamin A does not appear to have been realized.

In 109 of 6,254 operations a spontaneous internal biliary fistula was seen. This fistula as well as the gall stone obstruction of the bowel can be ascertained with a roentgenogram which shows the accumulations of gas.

In regard to complications, stomach symptoms can be relieved by operation in 70 per cent of acute and in only 40 per cent of chronic cases of cholecystitis. Therefore, one should restrain operation in catarrhal inflammation of the gall bladder. Removal of the gall bladder is not responsible for gastric symptoms. Stomach complaints following operation frequently give rise to the question of ulcer. One should not be deceived by a niche, which is often a result of adhesions. Only occult blood proves its existence. The clinic has carried out a follow-up of 3,600 patients by questionnaire. Only 10 per cent of the patients had severe complaints. Six tables and 15 illustrations are included in the original article (FRANZ). JOHN L. LINDQUIST, M.D.

MISCELLANEOUS

Sandler, B. P. Chronic Abdominal Pain Due to Hypoglycemia. *Surgery*, 1941, 9: 331.

The author calls attention to the fact that a chronic hypoglycemic state may produce chronic recurrent abdominal pain, the pain often leading to unwarranted laparotomy. Five such cases are presented in detail to illustrate the point that patients suffering from an abnormal glucose metabolism in the form of hypoglycemia are often mislabeled "neurotics" and are subjected to many operative and diagnostic procedures in vain, when, in fact, a glucose tolerance test will make the diagnosis clear.

From varied experimental work of others, the author believes that increased gastric motility and even tetany of the stomach is produced by hypoglycemia. This increased gastric activity, together with increased activity of the biliary tract, results in the recurrent attacks of pain. The pain may be generalized or localized. It may be localized to the epigastrium, to the right upper quadrant with radiation to the back or shoulder, or to either or both of the lower abdominal quadrants. Associated with a state of hypoglycemia there is often tremor, sweating, pallor, tachycardia, and severe headaches. These

latter symptoms may overshadow the abdominal symptoms. In 2 of the cases reported the headaches were so severe that the individuals underwent diagnostic procedures as brain tumor suspects. The headaches thought to be due to increased capillary permeability as a result of the metabolic disturbance with escape of fluid into the surrounding brain tissue.

Curiously enough treatment of this hypoglycemic state is most successful with the employment of low carbohydrate diets with increased protein and fat (carbohydrate 75 to 100 gm, protein 75 to 125 gm, fat 100 to 150 gm) with between meal feedings and bedtime feedings. The success of this paradoxical type of feeding is explained by the author as follows.

The hypoglycemic state is not due to increased pancreatic activity but is due to inhibition of the liver glycogen output. The ingestion of carbohydrate rich foods inhibits the liver output of glucose in such a way as to bring about hypoglycemia. On a low carbohydrate intake such suppression is avoided and subsequent hypoglycemia prevented.

Of the 5 patients reported on in detail 3 had had an appendectomy, 1 a cholecystectomy, and 1 a

hemorrhaphy. One of the patients had in addition undergone encephalography twice because of headaches. In no case were the symptoms relieved by the operative procedure. Glucose tolerance tests showed the highest blood sugar concentration to be not more than 145 mgm, and in some of the cases the blood sugar concentration did not rise above 100 mgm. The lowest blood sugar value was usually in the neighborhood of 50 mgm. Two of the patients had the typical flat type of curve. All the patients were either entirely relieved or greatly benefited with the low carbohydrate diet, although the effect was obtained in some instances only after several weeks of the diet.

The author believes the disorders masquerading as pseudo-ulcer, chronic appendicitis, abdominal migraine, effort syndrome, and neurocirculatory asthenia are in fact due to chronic hypoglycemia. Unpleasant emotional states, psychic trauma, and worry may derange the carbohydrate metabolism and lead to functional disorders. There is considerable theoretic discussion regarding this phase.

LUTHER H. WOLFF, M.D.

A SURVEY OF ESTROGENIC DOSAGE

Collective Review

AUGUST A. WERNER, M.D., St. Louis, Missouri

THE published reports of research on natural estrogenic hormones and their esters are very conflicting with regard to potency and adequate dosages for clinical use. It seems that most of the difficulty in evaluating these substances for human use results from attempting to use biological effectiveness in laboratory animals as a criterion for effectiveness in the human being, without giving due consideration to species specificity.

Since the literature contains authentic reports of experiments with these estrogens in the human being, it seems desirable to study the available evidence in the various publications in an attempt to arrive at some definite conclusions.

INDICATIONS FOR THE USE OF ESTROGENIC HORMONES

Estrogens have been recommended to relieve a multiplicity of feminine ailments, including acne, sterility, vomiting of pregnancy, abortion, gonorrheal vaginitis in children, senile vaginitis, pruritus vulvæ, kraurosis vulvæ, and all types of menstrual disorders, and to relieve the subjective symptoms accompanying castration, ovarian hypofunction, the climacteric, and involutional melancholia. Estrogens are a valuable addition to the long list of preparations available for treatment in modern medicine. As with any other therapeutic agents, they have their limitations. They do not always relieve all of the conditions mentioned, and in some, it is a question whether they are indicated. There are some cases of sterility in which endocrine factors are not at fault, and even if the sterility is due to endocrine imbalance, there may be many other mitigating factors which might prevent successful results. Estrogens have been advocated for correction of the various types of menstrual disorders, such as primary and secondary amenorrhea, hypomenorrhea, oligomenorrhea, menorrhagia, metrorrhagia, and functional uterine bleeding. It is obvious to anyone who understands endocrine physiology and the anterior pituitary lobe, gonad, thyroid, and uterine interrelationship, besides other health-influencing factors, why treatment of these condi-

tions is frequently so disappointing. The one group of conditions which invariably responds to estrogenic hormone therapy with gratifying results is the syndrome of subjective symptoms that accompanies castration, ovarian hypofunction, the climacteric, and involutional melancholia (18, 19).

DIAGNOSIS

There probably are no other biological sciences so difficult to comprehend as biochemistry and physiology. The functions of the ductless glands and related structures involve the chemical and physical processes of life. To understand endocrinology, one must have a thorough knowledge of the following subjects: anatomy, both gross and microscopical, pathology, physiology, normal and pathological, chemistry, and biochemistry, besides this, one must be a good internist, know much of obstetrics and gynecology, be a fair psychiatrist, and have an abundance of clinical sense.

A thorough detailed history is of utmost importance and this cannot be of use unless one has knowledge of the sciences given above, supported by a broad understanding of clinical medicine and endocrine physiology. This must be followed by a complete physical examination and the necessary laboratory work upon which to base an opinion. Many patients are treated without having had an adequate minimum diagnostic survey upon which to arrive at reasonable conclusions. Various endocrine products are frequently administered in a haphazard manner. There are no substitutes for correct diagnosis and judgment based upon thorough clinical experience.

Additional aids for endocrine diagnosis are the various biological tests, such as hormone content of the blood and urine, changes in the vaginal smear, pH determination of the vaginal secretions, and examination of endometrial and vaginal tissue, obtained by curettage or the suction curette and the vaginal clip.

Some of these tests are not difficult to do and are inexpensive, while others, such as determination of the hormone content of the blood and urine, require the services of an expert technician and laboratory animals, and are expensive. Single tests of blood and urine are of no practical value,

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but must be done in series over at least one or two menstrual cycles which renders the cost prohibitive except for experimental purposes

ESTROGENIC HORMONES

The principal natural estrogenic hormones that are chemically available in a crystalline state are estradiol (dihydroxyestrin dihydrotheelin) estrone (ketohydroxyestrin theelin) and estriol (trihydroxyestrin theelol). Doisy and his co-workers (13) in 1935 reported the isolation of an ovarian follicular hormone (estradiol dihydrotheelin) in crystalline form from the follicular fluid of pig's ovaries. Doisy and his co-workers (23) in 1938 reported that evidence indicates quite clearly that the principal ketonic estrogen of sow ovaries is theelin. The actual concentrations of theelin and dihydrotheelin per kilogram of sow ovaries are 20 rat units of theelin and 220 rat units of dihydrotheelin; this is equivalent to 0.010 mgm of theelin and 0.014 mgm of dihydrotheelin per kilogram.

Westerfeld and Doisy (22) found that when dihydrotheelin (estradiol) is injected into a normal adult castrate or a castrate hysterectomized monkey from 30 to 45 per cent of the excreted estrogenic activity is ketonic (theelin estrone). When theelin is injected into a normal adult castrate or a castrate hysterectomized monkey from 30 to 50 per cent of the excreted estrogenic activity is non ketonic (estradiol dihydrotheelin). The evidence indicates that in the monkey the reaction between theelin (estrone) and dihydrotheelin (estradiol) is reversible and that the ovaries and uterus are not essential for this transformation.

Estradiol (dihydrotheelin) is not commercially available from ovarian tissues. It is identical with a reduction product which was made synthetically and which is marketed under the names of progynon DH, dimenformon and ovoclyn. Another related compound is alpha-estradiol benzoate (progynon B, dimenformon benzoate and ben ovoclyn).

The natural estrogenic hormones are steroids and they are closely related in chemical structure. There is another compound having marked estrogenic activity which does not necessarily enter into the subject matter of this paper but because of the attention which has been given to it in numerous publications recently mention of it will be made here. In 1938 Dodds, Goldberg, Lawson and Robinson (4) reported the synthesis of a new estrogenic agent diethylstilbestrol. It does not contain the phenanthrene ring system which is common to estrogenic steroids but has a nucleus

containing two phenol rings joined by a carbon chain. Stilbestrol while active estrogenically, especially orally, seems to be rather toxic when administered to human beings in a large percentage of patients (2, 12, 16, 25). Toxic symptoms include nausea, vomiting, cutaneous eruptions and possibly liver damage.

METHODS OF ADMINISTRATION OF ESTROGENS

There are five methods of administration of estrogens: namely oral, intramuscular, local by injection and by implantation. Theelol (estriol) is said to be more active when given orally than is theelin (estrone). The intramuscular injection of estrogens is very satisfactory, especially when in solution in oil. The dosage absorbable is more accurately controlled in oil solution and the rate of absorption when in oil is slower and more prolonged which produces constant stimulation. Local application is made by placing suppositories in the vagina. This probably is the best method for effect on the vaginal mucosa, especially in gonorrheal vaginitis. Estrogens are absorbable when applied to the skin in alcoholic solution and when incorporated in oil or an ointment base. This method seems rather inaccurate in addition to placing these preparations in the hands of the public. Hormones are powerful biochemical agents and are capable of much harm to the patient if they are not needed or if over dosages are given. Lay people are incapable of diagnosis and knowledge of therapeutics and for their protection hormones should be administered only under the personal supervision of a physician.

Deanesly and Parkes (3) in 1937 were the first to report the use of crystalline androgens and estrogens by subcutaneous implantation of crystals or pellets. This method has since been used in implanting pellets of androgens and estrogens in human beings and desoxycorticosterone acetate for the treatment of Addison's disease (17). Several factors may influence the absorption rate such as the surface area and the density of the pellet, vascularity of the implantation site and the tissue reaction to a foreign body. Another problem to be considered is that there is no control of dosage; it being taken for granted that the body will utilize only what is needed, which is questionable. There is no reason to believe that only the necessary amount of hormone for normal function will be absorbed. If an excess amount of any substance capable of influencing body cells is present in the various tissues of the body it seems reasonable to believe that hyperstimulatory effects may be produced. This is exactly what occurs when any gland hypersecretes as in hyperthyroidism by

perparathyroidism, hyperinsulinism and in hyperpituitarism (gigantism and acromegaly). The hormonal secretion of glands is not a continuous process of constant volume, but is subject to varying physiological demands, as for instance, the secretion of insulin, and adrenaline. There is another possible objection to implantation of crystalline estrogen pellets. It is known that the normal secretion of estrogen in the woman is cyclic. Implantation of estrogen pellets affords continuous absorption, and thereby prevents cyclic function. In other words, the implantation of crystalline hormones removes the possibility of control of the dosage.

That overdosage and absence of control of dosage may have grave consequences is proved by the reports of Ferrebee, Ragan, Atchley, and Loeb (7), and of Kuhlman and his coworkers (10), who had serious complications and untoward results in several patients following the use of desoxycorticosterone esters. Ferrebee, *et al* (7) state, "extreme caution must be exercised in the administration of desoxycorticosterone esters because excessive amounts may lead to the development of hypoproteinemia, marked edema and cardiac insufficiency."

TESTS FOR ADEQUATE DOSAGE

The principal tests for adequate dosage of estrogens are, (1), clinical observation, (2) the vaginal smear test, and (3) biopsy of vaginal and endometrial tissue.

Observation based upon a knowledge of normal and abnormal conditions and syndromes plus clinical experience is of utmost value. The statements of castrate women, women having ovarian hypofunction (in the menacme), in the climacteric, and those with involutional melancholia, regarding relief of subjective symptoms is pleasing proof of adequate estrogenic dosage. The changes observed in patients, from intense subjective nervousness to calmness, from depression and crying to cheerfulness, from fatigue to normal vigor and endurance, absence of hot flushes, all are unmistakable signs of adequate treatment.

Papanicolaou and Shorr (14) in 1936 offered the vaginal smear test as a physiological criterion for the effectiveness of estrogenic treatment during the menopause. They showed that estrogenic treatment induces progressive changes in the vaginal epithelium that are comparable to the type observed in normal women during the follicular phase of the menstrual cycle. When the vaginal smear is changed from a leucocytic picture to cornification of squamous epithelial cells, treatment is considered adequate. However, in

many cases symptomatic response occurs before the vaginal changes are complete.

Broun (21) who examined the vaginal smears from 16 castrate girls who were treated with theelin in oil over a period of thirty days states, "It is quite evident from the present study that changes in the vaginal secretion are a much less delicate index of the effectiveness of estrogenic material than is an examination of the uterine mucosa secured by curettage. In the smallest dosages employed the changes in the uterine mucosa were definite and striking. It is also quite obvious that symptomatic relief can be secured in dosages that are too small to produce definite changes in the vaginal secretion, since the group of subjects receiving the smallest dosage apparently secured as much relief of symptom as those who received larger doses." Allen states (1), "We have found the relief of symptoms a more accurate guide to proper dosage than the changes in the vaginal smear."

Examination of endometrial tissue is another method of estimating effective estrogenic dosage. The most easily obtainable and dependable criterion of sufficient estrogenic dosage in the climacteric and related conditions is relief of subjective symptoms as expressed by the patient.

CLAIMS FOR POTENCY OF ESTROGENIC HORMONES

In the first report on the isolation of estradiol (dihydrotheelin) from pig's ovaries, Doisy and his coworkers (5) stated, "the new compound seems to be identical with a reduction product of theelin, which is called dihydrotheelin. It is from four to eight times as potent as theelin in adult castrate rats and approximately as active as theelin in immature rats. Other physiological tests must be run to establish the full range of activity of the new compound."

By some methods of assay various investigators have reported differences in potency between alpha-estradiol and theelin (estrone) ranging from 1:1 (11) and 5:1 (11) to 12:1 (24), which indicates the difficulty of arriving at uniform results as any of these may be used for argumentative purposes. Whitman, Winterstener, and Schwenk (24), using the rat for assay of alpha-estradiol benzoate (progynon-B), estimated it to be twelve times as potent as estrone.

Laqueur (11), using both rats and mice as assay animals, reported (translation), "when the monobenzoate of dihydrofollicular hormone (progynon-B) was assayed by using rats, we found that the compound is five times more active than the standard preparation (ketohydroxy follicular hormone) (theelin, estrone) however, using mice

we found that the preparation has the same activity as the standard Laqueur aptly states

One cannot say anything about the therapeutic effect in human beings compared to folliculin (theelin estrone) (Parentheses by author)

Parkes states (15) "The relation between one I U (international unit of free hormone) (theelin estrone) and one I B U (international benzoate unit) whether clinically or experimentally determined must depend on the method of administration and the test object employed and can have no general significance

This is where the difficulty arises. It is theoretically possible that as many different comparisons may be shown as there are species of animals that may be used in the tests. The ultimate goal in endocrine therapy is effectiveness in the human being. That theelin (estrone) is equally or more active biologically than alpha estradiol benzoate (progynon B) in the human being is indicated by a correlation of published research by different investigators

RESEARCH IN THE HUMAN BEING

Kaufmann (8, 9) succeeded in preparing a premenstrual endometrium in a twenty one year old girl by giving 210 000 mouse units of progynon benzoate (1 000 000 international units) over a period of twenty one days plus 5 Rb U of proluton for seven days. Kaufmann states (9) "In my first experiments I employed daily injections of oestrin benzoate 1 cc of which contained 50 000 international units. All my later work was carried out with twice weekly injections of oestrin 1 cc of which contained 250 000 international units. We owe this highly concentrated preparation to the researches of Schwenk and Hildebrandt who showed that hydrogenation converts oestrin into a much more active derivative. In this same article Kaufmann calls this new active derivative dihydroxyoestrin which is estradiol. He also reported treatment of primary and secondary amenorrhoea and of castrates and climacteric women for relief of symptoms with dosages ranging from 500 000 to 15 000 000 international units of estradiol.

Kaufmann (9) in summarizing research with estrogenic hormones states "To repeat My experiments showed that to reproduce a proliferation phase in the endometrium of a castrate woman on a single occasion 1 000 000 international units of oestrin are necessary.

Werner and associates (20) produced the premenstrual endometrium in a castrate woman by intramuscular injection of 4 000 I U of theelin (estrone) in oil daily over a period of twenty-one

days (total theelin 84 000 I U) during the last seven days of which 10 I U of progesterone in oil were injected daily (total progesterone—70 I U). This woman began to menstruate two days after cessation of the injections and flowed normally for five days.

Elden (6) in an experiment to produce the premenstrual endometrium and using alpha-estradiol benzoate (progynon B) and proluton summarized as follows: A premenstrual endometrium could not be prepared in five castrated human females using 50 000 R U of estrin (250 000 international units) plus 12-60 Rb U of progesterin. No premenstrual changes were noted when 30 000 R U of estrin and 12-14 Rb U of progesterin were given. Bleeding can be induced in the castrated human female with 50 000 R U estrin (progynon B) alone. It is not markedly delayed if estrin plus progesterin is given. Bleeding can be produced with only 30 000 R U estrin if followed by 12-14 Rb U of progesterin. Hot flushes are only temporarily relieved with estrin. When therapy is stopped the symptoms return in their original frequency and severity. In this article Elden states "The estrin (Progynon B) prepared from mare or stallion urine was furnished by Schering Corporation. It contained 10 000 R U per c.c. (50 000 international units) in oil and was used throughout this study. Chemically it is the benzoic acid ester of dihydroxyoestrin.

Werner and his coworkers (1) using theelin (estrone) in oil (500 I U every third day for ten doses) found that it stimulates development of the sex related structures of the human female castrate producing changes in the breasts and gross appearance of the vagina with increased mucous secretion and growth of the endometrium and vaginal mucosa following total dosages as low as 5 000 I U. Definite changes in the vaginal smears were noted with total dosages of 10 000 I U theelin in oil (1 000 I U every third day for ten doses).

Uterine bleeding lasting from three to seven days occurred five to six days after cessation of the injections with total dosages of 5 000 I U theelin in oil (500 I U every third day for ten doses).

According to the above experiments theelin (estrone) is more potent in the human being than alpha estradiol benzoate (progynon B). The assay of estradiol and its compounds on the rat greatly magnifies their activity because of the extreme sensitivity of the rat to these substances. This same degree of sensitivity to estradiol and its compounds is not present in the human being nor even in the mouse.



Fig 1 Atrophic endometrium of a castrate girl before treatment

DISCUSSION

Much of the information obtainable from various publications and advertising literature regarding estrogenic potency and dosage is confusing to physicians. Claims for potency are made, based upon animal experimentation, especially the rat, and the effectiveness of International Units in the rat is noted. Obviously effective dosages of any substance used in the rat cannot be translated into effective dosages for the human being, any more than they can be in the case of the mouse.

The fallacy lies in trying to convert biological activity of the rat and mouse units by weight in animals into definite biological activity in the human being and at the same time ignore species specificity. To determine the average effective dosages in the human being, it is necessary to do experiments with estrogenic hormones in castrate women. This has been done by Kaufmann, with estradiol benzoate and alpha-estradiol benzoate by Elden, with alpha-estradiol benzoate (progy-non-B), and by Werner and associates, with theelin (estrone).



Fig 2 Premenstrual endometrium produced in the same castrate girl by intramuscular injection of 4,000 international units of theelin (estrone) in oil daily for twenty-one days (total dosage 84,000 I U) plus 10 I U of progesterone daily during the last seven days (total progesterone—70 I U)

CONCLUSIONS

- 1 A comparison of published research indicates that theelin (estrone) is more potent than alpha-estradiol benzoate (progy-non-B) in the human being.

- 2 A premenstrual endometrium was produced in a castrate woman by a total intramuscular injection of 84,000 International Units of theelin (estrone) in oil over a period of twenty-one days, during the last seven days of which a total of 70 I U of progesterone were injected.

- 3 Endometrial growth, cornification of the vaginal epithelium, and uterine bleeding occurred following a total intramuscular injection of 5,000 I U of theelin over a period amounting to thirty days.

- 4 Published research indicates that extremely large dosages of alpha-estradiol benzoate (progy-non-B) are necessary to duplicate the effects of comparatively small dosages of theelin (estrone) in the human being.

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GYNECOLOGY

UTERUS

Lucchetti, G Traumatic Perforations of the Uterus (Le rotture traumatiche dell'utero) *Clin Obstet*, 1940, 42 314

Traumatic perforation of the uterus, even if not very rare, is always an exceptional occurrence. Some of the cases are complicated by visceral lesions. In the last few years the increase in these cases has been due to the greater frequency of criminal attempts at abortion, and to the increased tendency toward laparotomy. Although many criminal perforations, especially if not complicated, are not medically reported, about 43 per cent of the cases are due to this cause.

The lesion is frequently at the bottom of the uterus, and in the isthmic region. For topographic reasons, the intestinal lesion can be taken care of more easily when a perforation of the isthmic region is present.

Perforation is more frequent in the lower part of the uterus when this is in a normal position, in the isthmic region in flexions, in the posterior part in anteflexions, and in the anterior part in retroflexions. Abortive pincers (forceps) are used in the majority of cases of perforation, and often when the perforation is joined with visceral lesions. This result is due to the strong grip of which the pincers are capable. They grasp an intestinal loop, after the perforation of the uterus, and draw this through the perforation.

Visceral lesions are more frequently caused by doctors than by midwives or laymen, because, generally, Winter pincers (forceps) are used by doctors. In criminal abortions the explanation may be found in the ignorance of those who perform this operation, but there are some cases in which the perforation occurs because of chronic metritis, chorioepithelioma, the menstrual period, cancer and other tumors, tuberculosis, senile marasmus, cardiac affections, and old scars after scrapings, pregnancy, and labor.

Lesions of both the large and small intestines are combined with the uterine perforation. They may vary from a simple decortication of the mesenterous membrane, to the removal from the mesentery of a long section of the intestinal tube, or to the detachment and removal of a large portion of the mucous membrane.

In the uncomplicated cases, the symptoms are slight, pain is not intense and hemorrhage is negligible, while in cases complicated by visceral lesions symptoms are more marked. There may be acute pain accompanied by inflammation of the peritoneal region, distention of the abdomen, and vomiting. After a period of from twelve to forty-eight hours after the accident, the symptoms are aggravated because of the onset of peritonitis.

The mortality rate may be as high as 28 per cent, but there are many factors to be considered.

- 1 The site of the lesion—the lower part of the uterus is more dangerous.
- 2 The extension of the perforation, its size, and depth.
- 3 The kind of lesion, whether simple or complicated. Among the latter type the most usual is the intestinal lesion, which becomes more severe as it increases in size. The mortality is higher when the large intestine is involved than when the small intestine is involved.
- 4 The immediacy of the intervention is decisive if operation is performed ten hours after the perforation the result may be favorable, while after twenty-four hours the outcome is very doubtful.
- 5 Sterilization of the instruments responsible for the perforation.
- 6 The condition of the interior organs and of the uterus at the time of perforation.

For simple perforations and for those not too extensive, a simple endo-uterine stopper is sufficient, such as ice on the abdomen and rest. For combined lesions, rapid intervention, exploratory laparotomy, suture of the uterus and of the intestine, or hysterectomy may be necessary, and in some cases drainage of the peritoneum, of the abdominal cavity, of the vaginal cavity, or of both the vaginal and abdominal cavities is required.

NELDA CASSUTO

ADNEXAL AND PERIUTERINE CONDITIONS

Wallis, O The Role of the Fallopian Tubes in the Spread of Pelvic Cancer *Am J Obst & Gynec*, 1941, 41 196

The presence of free cancer particles in the normal fallopian tube may indicate the pathway of spread of pelvic cancer. A case is reported illustrating the spread of pelvic carcinoma by way of the fallopian tube.

EDWARD L CORNELL, M D

MISCELLANEOUS

Hoffmann, F, and Treite, P Comparative Investigations of the Action of Female and Male Sex Hormones and Suprarenal Cortex Hormones on the Uterus (Vergleichende Untersuchungen ueber die Wirkung von weiblichen und maennlichen Keimdruesenhormonen und von Nebennierenrindenhormonen auf den Uterus) *Zentralbl f Gynaek*, 1940, p 1603

The authors castrated 12 rabbits, weighing from 500 to 800 gm, and eight days later treated them with from 0.75 to 4 gm of progesterone daily for eight days. On the ninth day, they found that the uterus was enlarged and that the mucosa was in a secretory phase which, however, differed in some points from the transformation phase observed after

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Lesions of both the large and small intestines are combined with the uterine perforation. They may vary from a simple decortication of the intestinal serous membrane, to the removal from the mesentery of a long section of the intestinal tube, or to the detachment and removal of a large portion of the mucous membrane.

In the uncomplicated cases, the symptoms are slight, pain is not intense and hemorrhage is negligible, while in cases complicated by visceral lesions symptoms are more marked. There may be acute pain accompanied by inflammation of the peritoneal region, distention of the abdomen, and vomiting. After a period of from twelve to forty-eight hours after the accident, the symptoms are aggravated because of the onset of peritonitis.

The mortality rate may be as high as 28 per cent, but there are many factors to be considered.

1 The site of the lesion—the lower part of the uterus is more dangerous.

2 The extension of the perforation, its size, and depth.

3 The kind of lesion, whether simple or complicated. Among the latter type the most usual is the intestinal lesion, which becomes more severe as it increases in size. The mortality is higher when the large intestine is involved than when the small intestine is involved.

4 The immediacy of the intervention is decisive if operation is performed ten hours after the perforation; the result may be favorable, while after twenty-four hours the outcome is very doubtful.

5 Sterilization of the instruments responsible for the perforation.

6 The condition of the interior organs and of the uterus at the time of perforation.

For simple perforations and for those not too extensive, a simple endo-uterine stopper is sufficient, such as ice on the abdomen and rest. For combined lesions, rapid intervention, exploratory laparotomy, suture of the uterus and of the intestine, or hysterectomy may be necessary, and in some cases drainage of the peritoneum, of the abdominal cavity, of the vaginal cavity, or of both the vaginal and abdominal cavities is required.

NELDA CASSUTO

ADNEXAL AND PERIUTERINE CONDITIONS

Wallis, O The Role of the Fallopian Tubes in the Spread of Pelvic Cancer *Am J Obst & Gynec*, 1941, 41 196

The presence of free cancer particles in the normal fallopian tube may indicate the pathway of spread of pelvic cancer. A case is reported illustrating the spread of pelvic carcinoma by way of the fallopian tube.

EDWARD L. CORNELL, M D

MISCELLANEOUS

Hoffmann, F, and Treite, P Comparative Investigations of the Action of Female and Male Sex Hormones and Suprarenal Cortex Hormones on the Uterus (Vergleichende Untersuchungen ueber die Wirkung von weiblichen und maennlichen Keimdruesenhormonen und von Nebennierenrindenhormonen auf den Uterus) *Zentralbl f Gynaek*, 1940, p 1603

The authors castrated 12 rabbits weighing from 500 to 800 gm., and eight days later treated them with from 0.75 to 4 gm. of progesterone daily for eight days. On the ninth day, they found that the uterus was enlarged and that the mucosa was in a secretory phase which, however, differed in some points from the transformation phase observed after

estrone and progesterone treatment Hohlweg has confirmed these findings in his own experiments

Enlargement of the uterus and growth of the mucosa without formation of scales in the vagina were also produced in immature castrated mice with from 0.2 to 0.4 mgm of progesterone alone given daily

Under the same experimental conditions the authors tested the influence of suprarenal cortex hormone (desoxy corticosterone) on the uterus of immature castrated rabbits and mice 1 mgm of cortison had no effect but from 5 to 10 mgm daily led to enlargement of the uterus and to the appearance of a transformation phase in the endometrium of the rabbit No scale formation was found in the mouse Testosterone (from 1.5 to 10 mgm daily) caused marked growth of the uterine mucosa and musculature

The progesterone like action of commercial preparations made from suprarenal cortex was observed in the Clauberger test (consequently after preliminary treatment with estrone) It was found that complete transformation of the uterine mucosa could be obtained with 1.2 mgm of cortenil (Bayer) with from 5 to 6 mgm of per corten (Ciba) or with from 5 to 8 mgm of cortison (Scherer) this corresponds to a progesterone action of 0.6 mgm From these the authors conclude that cortenil is contaminated with progesterone

In the Clauberger test testosterone propionate showed no progesterone action or at most a very slight one

Therefore in order to produce a transformation phase in the immature castrated rabbit with progesterone alone it is necessary to use from 60 to 80 times more progesterone than when the animal has first been treated with estrone A pure growth action is caused in the uterus not only by estrone but also by testosterone progesterone and desoxy corticosterone which are mentioned in decreasing order of their importance

(BUETTNER) RICHARD KEMEL MD

Henriksen E A Clinicopathological Investigation of the Causes of Menorrhagia *Am J Obst & Gynec* 94 41 179

A series of 1500 women between the age of twenty and forty years complain primarily of abnormal uterine bleeding are presented from a clinicopathological approach The misinterpretation of the endometrial patterns and the misapplication of terminology have done much to complicate the present status of investigative and therapeutic work in menstrual aberrations Though endocrinopathies manifestations are important factors in the cause of abnormal uterine bleeding factors of anatomical nature are more common and should be ruled out before the cause is interpreted as functional or dysfunctional in type Therapy to be adequate demands a thorough and complete investigation of the entire system with a proper interpretation and appreciation of the findings No attempt has been

made to offer new theories change the classification or advance new ideas of therapy the clinical aspects of the case and the associated tissue changes have been studied

MAJOR FACTORS INTERPRETED AS THE CAUSES OF ABNORMAL BLEEDING IN 1500 WOMEN BETWEEN THE AGES OF TWENTY AND FORTY YEARS WITH THE PRIMARY COMPLAINT OF ABNORMAL UTERINE BLEEDING

Major factors	No. of cases	Percentage	Per cent
Cause of bleeding unknown	97	27.0	3
Cervical infection	48	20.2	9.8
Myometrial infection	18	4.8	7
Ovary	76	4.5	5.0
Physiological changes	76	0.4	5
Cervical malformation	57	7.8	3.8
Tubal infection	7	3.7	8
Sentinel	7	2.3	
Endometrial infection	6	2	
Uterine	4	0.54	6
Rectum	3	0.4	1
Total	729		

Major factors	No. of cases	Percentage	Per cent
Follicular phase	87	4	2.4
Negative postmenstrual	44	6	8.2
Puberty	3	3.4	6.8
Endometrial polyp	2	13	6.8
Implantation	82	6	5.4
Endometrial hyperplasia	70	9	4.6
Proliferation	53	6.9	3.5
Interruption of bleeding	33	4.3	2
Gestational	8	1	0.53
Postmenstrual	5	6	0.3
Tubal		3	0.3
Abnormal gestation	2	3	3
Total	77		

Group A includes those cases in which either the patient emotionally or physically obtained the majority of the material used in the study by examination of the gross specimen of the endometrium and/or of the uterine tissue

EDWARD L. CORNELL MD

Kennedy W T Urinary Incontinence Restored by Restoration and Maintenance of Normal Position of the Urethra *Am J Obst & Gynec* 94 4 6

The normal urethra enters the vagina and is pushed down with the vaginal wall into the vagina its external meatus is pushed downward out of the pelvis by varying distances up to 1 cm and the sphincter muscle surrounding the inner third of the urethra dilates A varying degree of the voiding state (which becomes permanent following ligation or injury) is present when there is persistent incontinence the greater the degree the greater is the incontinence When there is no permanent dilatation of the inner third of the sphincter the urethra may undergo excessive degrees of motion without any incontinence However persistent displacement may

in time permanently overstretch the inner third of the sphincter, in which case incontinence will develop

The sphincter mechanism functions with its greatest efficiency when its greatest length is restored, when it is restored as far as possible within the pelvis and restored as high as possible above the vagina. To fulfill the restoration of the urethra it is first necessary to completely separate the urethra from all attachments to the vaginal wall and the ram, both of which, following injury, will hamper the function of the sphincter mechanism. After the urethra is completely freed, restoration of the sphincter mechanism can be satisfactorily accomplished by plication and replication of the under surface of the bladder and urethra.

The sphincter mechanism, unhampered by any lateral tractive forces after restoration, will perform its normal function. The sphincter mechanism probably requires no assistance of the levator muscle fibers, and the vaginal wall beneath the bladder and urethra is only a protective floor on which the bladder and urethra lie. Any factor such as infection or hematoma beneath the restored urethra may dissolve the plicating sutures and allow the urethra in whole or in part to resume some degree of the "voiding" state, and thereby produce a failure, and reoperation will be necessary. For success, restoration must be maintained bilaterally. Maintained restoration can best be accomplished by very free drainage of the paravesical spaces and open vaginal wall flaps.

The success of any incontinence operation will be measured by the fulfillment of the restoration herein described and the maintenance of that restoration.

EDWARD L. CORNELL, M.D.

Heynemann, T. Genital Tuberculosis in the Female (Die weibliche Genitaltuberkulose). *Geburtsh u. Frauenheilk*, 1940, 2 337

In the entire world literature there is not one single absolutely proved case of primary genital tuberculosis. Nevertheless the possibility of its occurrence must be recognized. In 90 per cent of all the varieties of female genital tuberculosis the fallopian tubes are involved, and in 90 per cent of the tubal involvement the condition is bilateral, in about 25 per cent of the cases the tubal tuberculosis represents the only disease focus in the female genital tuberculosis. In only from 25 to 30 per cent of the cases of tubal tuberculosis is there a coincidental involvement of the ovary. In from 30 to 40 per cent of the cases of peritoneal tuberculosis there is also a tuberculosis of the tubes, and in about 50 per cent of the cases of female genital tuberculosis there is a co-existing peritoneal tuberculosis. However, a coincidental pulmonary tuberculosis is found in from 80 to 90 per cent of the cases of female genital tuberculosis. In the cases in which peritoneal tuberculosis and tubal tuberculosis exist simultaneously, it is possible that both of these conditions may have developed either hematogenically or lymphato-

genically. It is possible for tubal tuberculosis to have its origin in the peritoneal tuberculosis and *vice versa*. Opinions still differ as to the frequency with which female genital tuberculosis, particularly tuberculosis of the tubes, may develop from a pre-existing peritoneal tuberculosis. The frequency of involvement of the tubes can be explained only by the assumption of a special susceptibility of the latter to tuberculosis. Next to the tubes, the endometrium becomes involved most frequently in female genital tuberculosis (well over 50 per cent of the cases), and in about 30 per cent of these cases the ovaries may develop tuberculosis. However, in 80 per cent of the cases of endometrial tuberculosis, there is also a co-existing tuberculosis of the tubes.

The primary infection with tuberculosis very frequently occurs during the age of childhood. Female genital tuberculosis may, therefore, develop soon thereafter, during the secondary or generalization stage of the tuberculosis, even during the age of childhood. And as a result of various conditions, endogenous reinfection may occur. It is generally recognized that this secondary endogenous development of female genital tuberculosis may easily develop from another tuberculous focus in the body. According to the opinion of the author, this etiology, because of its frequency of occurrence, is practically the only one leading to the development of female genital tuberculosis which comes into question. In addition to primary genital tuberculosis in the region of the vulva, vagina, and portio, it is possible that these regions may, even later in life, become the site of a tuberculous infection from without after a primary infection has already developed either in the respiratory passages or in the intestinal tract, especially during cohabitation (exogenous reinfection or superinfection). In the event of mixed infections the recognition of tuberculosis of the tubes is very difficult. From the point of view of pathological and anatomical researches, there are no recent results to be noted. The diagnosis must be established by means of histological examination. In the differential diagnosis, lues, actinomycosis, and foreign-body irritation must be excluded because they may produce similar changes.

The caseating exudative form is characterized by its rapid and destructive course, while the fibrous-tissue-producing form is characterized by the opposite. In every case in which there is a suspicion of tuberculosis, biopsy and histological examination should be performed. The diagnosis must never be made from the findings of palpation alone, but should be made on the basis of the accompanying symptoms and by the aid of special methods of examination. One may arrive at a sufficiently certain diagnosis by means of exploratory laparotomy and histological examination. The therapeutic effect of the exploratory laparotomy is entirely problematical. A prerequisite for the successful employment of the diagnostic cul-de-sac puncture is the mastering of the technique and animal inoculation. Only a positive result from the puncture is of significance. Should

the second examination of the material obtained on puncture yield a negative result then the diagnosis of tuberculosis may be abandoned especially if the serological test proof by means of the complement fixation has also yielded a negative result. An advantage of the serological determination of tuberculosis is by means of the complement fixation and flocculation tests as compared to the tuberculin test lies in the fact that positive reactions of a non-specific nature or because of an arrested pulmonary tuberculosis are much more rarely seen. Complement and flocculation reactions in the blood have not always yielded a completely uniform reaction so that one is unable to say that the one method is preferable to the other. A positive result in inflammatory conditions of the female genitalia should always lead one to think of the possible tuberculous nature if this positive result cannot be explained by existing tuberculosis of the lungs or other organs. Absolutely positive proof therefore can be obtained only by animal inoculation, culture and histological examination or laparotomy. In the case of a positive Aschheim Zondek reaction in adnexal tumor one must also think of the possibility of an adnexal tuberculosis.

Curettage for the purpose of establishing the diagnosis of genital tuberculosis must absolutely be rejected. It is only quite exceptionally when all acute symptoms and signs are lacking when the patient is completely afebrile and after the failure of other diagnostic aids that a very small curettage may be permitted. Any fragments of tissue which may be extruded from the uterus spontaneously should be examined histologically. Genital tuberculosis can be recognized and treated only on a purely clinical basis. The treatment is no longer an operative one but should be basically conservative (climate and x-ray irradiation). The diet should be rich in vitamins, protein and fat and as far as possible free from salt and carbohydrates. The prognosis is made considerably worse by the presence of fistulas and as a result of operations carried out in the region of the diseased genitalia. There is no special prophylaxis against female genital tuberculosis; the treatment is closely related to the prophylaxis of tuberculosis infection in any part of the body. In genital tuberculosis sexual relations the use of a condom and douches immediately following intercourse are forbidden.

(H. FUCH) HARRY A. SALZMAN, M.D.

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Casabona, U. Laboratory Investigations in Ectopic Pregnancy (Di alcune indagini di laboratorio nella gravidanza ectopica) *Folia demograph gynaec*, 1940, 37 451

The author emphasizes the difficulty of diagnosis in extra-uterine pregnancy and directs attention to the importance of accuracy of diagnosis in rational therapy. Of the various methods employed in diagnosing extra-uterine pregnancy, the sedimentation rate of the erythrocytes, and the leucocyte count are probably most frequently used. However, it is well known that in some instances none of these procedures may be of value. In an attempt to evaluate their diagnostic significance a study of 42 cases of extra-uterine pregnancy has been made. The site of the tubal pregnancy was in the ampulla in 60 per cent of these cases, in the isthmus in 38 per cent, and in the interstitial part of the tube in 2 per cent. Laparotomy or medical therapy was used in 38 cases, in the rest some form of colpotomy or medical therapy was used.

The author briefly reviews the results of various investigators on the diagnostic significance of the Aschheim-Zondek reaction in extra-uterine pregnancy. He states that the majority of investigators agree that a positive Aschheim-Zondek reaction depends upon the vitality of the chorionic villi. The fact that this reaction is not as intense in ectopic pregnancy as in intra-uterine pregnancy is attributed to a deficiency in the development of the chorionic villi and to their early degeneration. The author presents a brief review of further studies on the significance of the Aschheim-Zondek reaction in ectopic pregnancy and its various complications.

In the cases studied by the author the Aschheim-Zondek reaction was considered 3 plus positive in 2 cases (5 per cent), 2 plus positive in 11 cases (26 per cent) (at least 3 hemorrhagic follicles in the rabbit's ovary), 1 plus positive in 7 cases (16 per cent), and negative in 23 cases (54 per cent). The author concludes from these studies (1) that the diagnostic significance of the reaction is undoubtedly important but the test should also be considered in the light of the clinical manifestation, and (2) that in the presence of the latter factor and a negative Aschheim-Zondek reaction it is probably better to rely more upon the clinical manifestations.

The author briefly reviews the literature on the significance of the sedimentation rate in ectopic pregnancy. The sedimentation rate was found to be low in 14 (35 per cent) of the 42 cases which he studied, it was found to be average (from 15 to 30 mm) in 9 cases, and elevated in 5 cases. It was very much increased in 8 cases. In comparing the sedimentation rate with the biological reaction no direct or indirect relationship was observed.

A study of the leucocyte reaction in the author's cases revealed that in 5 cases a relative leucopenia (from 4,200 to 6,000) was present. A normal leucocyte count (from 6,000 to 9,000) was present in 16 cases and a marked leucocytosis in 12 cases. Leucocytosis was more consistently marked in the cases of ectopic pregnancy associated with rupture.

On the basis of these observations the author believes that the biological hormonal reaction, the sedimentation rate, and the leucocyte count represent tests which may be used in the diagnosis of extra-uterine pregnancy. After briefly discussing these various factors in extra-uterine pregnancy and its complications, he concludes that they are of some diagnostic value when used in association with clinical manifestations.

MICHAEL DEBAKEY, M D

Pignoli, R. The Existence of a Capsular Membrane in Tubal Pregnancy (Sulla esistenza di una membrana capsulare nella gravidanza tubarica) *Ginecologia*, Torino, 1940, 6 443

The question of whether there is a decidual or capsular membrane in tubal pregnancy has never been absolutely settled. Up until 1871 it was assumed that there was no true reflex decidua in tubal pregnancy such as there is in uterine pregnancy, but in that year Winckel reported a case in which there was anatomical evidence of such a decidua. After that, various authors published articles arguing for or against his findings. These articles are reviewed briefly, and the author describes 2 cases of his own which seem to him to prove that there is a membrane analogous to the uterine decidua in tubal pregnancy. Although he has made histological examinations of many tubes in which pregnancy existed he has found only these 2 in which there was decided evidence of a decidual membrane. However, he calls this a capsular, rather than a decidual, membrane, a name which has been suggested as not fixing absolutely the nature of the membrane. Cova and others have held that the membrane which envelops the tubal ovum is simply a continuation of the tubal mucosa and does not show any active decidual reaction.

The author gives photomicrographs of the findings in his 2 cases. They show a membrane which is analogous to that of the uterine decidua. He believes that the morphogenesis of this membrane is the same as that of the uterine decidua but its later development is different. It is too inelastic and has not sufficient proliferative capacity to go on developing as the uterine decidua does and so degenerates and finally ruptures at some point and allows the blood to escape into the tube, and if that is permeable, the blood flows into the peritoneal cavity and terminates the tubal pregnancy in this way. However, in these cases, particularly the second one, there were cells of an epithelioid type, definitely differentiable from

Langhans cells which had an appearance strikingly like that of true decidua cells and the author believes that there was a true though weak decidua reaction.

AUDREY G. MORGAN M.D.

Albers H. Pregnancy Edema (Das Schwellergeschw. d. Fetus) *Tf. p. d. Gg. w.* 940 8 38

The edema of pregnancy and the edema of renal disease are not identical and therefore must be considered and treated separately. The same is true also of course of edemas which are in no way related to pregnancy as for instance that accompanying decompensated cardiac deficiency. It is necessary to make a clear differential diagnosis between renal disease and the toxicoses of pregnancy. Goutic nephritis may be distinguished by the increased residual nitrogen. The pictures of nephrosis and of pregnancy toxicosis (which has also been classified as a nephropathy) are similar but the edema fluid of nephrosis contains little or no protein whereas that of toxicosis contains protein often in considerable quantity. Also the radium index in nephrosis is far above 20 mgm. per cent whereas that of toxicosis is constantly below 20 mgm. per cent. An interesting nephrosis or nephritis is frequently an indication for the interruption of pregnancy whereas toxicosis responds favorably to treatment.

The edema of the ankles in pregnant women is predominantly a static edema. The tendency toward edema in pregnancy is due to the acidification accompanying the increased metabolism which is associated with a discharge of sodium from the blood into the tissues and thus leads to increased osmotic pressure and water-binding capacity with a corresponding increase in the cellular protein passing from the vascular system into the tissues. Moreover the vascular system is more permeable to fluid and protein in pregnant women. Likewise the increase in venous pressure during pregnancy and labor forces about $\frac{1}{4}$ of a liter of fluid from the vascular system. Thus the tendency to edema is furthered by increased vascular permeability, increased filtration pressure, a lowered water-binding capacity of the serum, the hydrophilic power of the tissues and the increased saturability of the tissue proteins due to the increased sodium in the tissues.

The investigations of the author have shown that the blood volume in pregnancy edema is not increased by about 1 liter as in normal pregnancy but decreased by about 1 liter. In the nature of a concentration of the blood. On the second and fourth day after delivery a retrograde flow of water from the tissues into the vascular system occurs shortly preceding diuresis so that one might speak of a pre-diuretic plethora of the plasma.

From this knowledge of pregnancy edema the beginnings of which are already present in the normal physiological state a therapeutic attempt to influence metabolism is indicated. It is possible to dehydrate an edematous pregnant patient, an eclamptic patient even shortly before delivery by means of a raw vegetarian diet. A weekly diet plan

is presented. Its effect, attributed to the dehydrating action of potassium.

(FRAKEN) EDITH SCHNORE MOORE

Sheehan H. L. and Sutherland A. M. The Pathology of Heart Disease in Pregnancy. *J. Obst. G.* 940 47 597

An analysis was made of the clinical and pathological findings in 18 obstetrical patients who showed acute or chronic lesions of the heart valves at autopsy. These were compared with the autopsy findings of 215 non-pregnant women of child-bearing age who had similar valve lesions and of 705 obstetrical patients with normal valves. The following conclusions were drawn:

Chronic rheumatic valvular disease was present in 15 per cent of all obstetrical patients in this locality (Glasgow). The mitral and aortic valves were involved with about the same frequency as in women not pregnant but tricuspid lesions were found at autopsy much less commonly than in women not pregnant. The clinical diagnosis of particular chronic valve lesions was much better when heart symptoms were present than when they were not present but a correct diagnosis was made in less than half of the cases. The difficulties in clinical diagnosis make it impossible to place full reliance on studies based on clinical data alone.

The mortality in women with chronic valve lesions was 63 per cent, 0.9 being due to superimposed ulcerative endocarditis, 2.9 per cent to other cardiac causes and 5 per cent to complications not involving the heart.

Nearly half the patients had had some evidence of congestive failure. This was related to the type of valve lesion: severe mitral stenosis and mitral stenosis combined with aortic stenosis being the most serious while incompetence of the valves was of less significance. The degree of hypertrophy of the heart did not appear to be an important factor in decompensation.

Deaths during or immediately after labor are usually not due to the progressive exhaustion of a badly decompensated heart but are in most cases catastrophic acute heart failures in patients who have either not been decompensated or only slightly decompensated. Such acute heart failures are not satisfactorily described as acute pulmonary edema because the lungs are edematous at autopsy in nearly all patients suffering from heart disease.

The deaths during pregnancy or the late puerperium are several times as common as in patients not pregnant.

While many patients have never had congestive failure before a patient whose heart decompensates in a pregnancy will usually have the same condition in subsequent pregnancies.

The American Heart Association Classification is of some value when it is based on the patient's condition in the last quarter of pregnancy but it is not of help in assessing the prognosis before the stage of pregnancy.

OBSTETRICS

The belief that decompensation of the heart is related to myocarditis or acute pancarditis does not rest on a satisfactory basis, but simple recurrent endocarditis superimposed on chronic valve lesions shows a much higher incidence in pregnant women than in the non-pregnant and in those with decompensation than in those without it. The reason for the high incidence in obstetrical cases is obscure, but the recurrence appears to develop in the course of pregnancy and not in the puerperium. Recurrent endocarditis cannot be diagnosed satisfactorily during life except by inference. It is an important complication of chronic valve lesions.

Simple acute endocarditis occurs in pregnancy with about the same frequency as in women not pregnant, and does not present special features.

Ulcerative endocarditis superimposed on chronic valve lesions and subacute bacterial endocarditis are more common in pregnant women than in the non-pregnant. These conditions develop during the pregnancy and not in the puerperium. They may be based on recurrent endocarditis. They lead to a severe type of decompensation.

Primary ulcerative endocarditis without a previous chronic valve lesion is much less common in pregnant women than in women not pregnant.

A patient who has any kind of valve lesion—chronic, recurrent, acute, or ulcerative—may also have pyelonephritis, hypertensive toxemia, eclampsia, or puerperal sepsis, but these diseases do not have any relation to the valve lesion, either as cause or effect.

Deaths associated with congenital heart disease, cardiac neurosis, or syphilis or primary sclerosis of the aortic valve are rare. DANIEL G. MORTON, M.D.

MISCELLANEOUS

Stieve, H. The Flow of Blood Out of the Intervillous Space of the Human Placenta (Ueber den Abfluss des Blutes aus dem intervillösen Raum der menschlichen Placenta). *Zentralbl. f. Gynaek.*, 1949, p. 1570.

Examinations were conducted upon 154 human uteri during all the months of pregnancy from beginning to term. As they were made on organs obtained by operative removal, the preparations were so fresh that all histological details were quite clear. The conditions of the cervical parts, the isthmus, and the musculature were examined as well as the development, the construction, and the relations of that placenta. The work forms a continuation of that reported in publications of 1935 and 1936.

The results of the examinations can be shortly summarized as follows:

Venous blood flows out of the intervillous space into the reaches of all parts of the human placenta. In the veins which drain the intervillous spaces, one finds especial arrangements in the form of valves and muscle ridges which function in such a manner as to direct the bloodstream from the placenta toward the heart. The arrangement of the cotyledons shows

plainly that Spanner's theory regarding the blood circulation in the placenta is false. If his theory, that the venous blood flows out only in the vicinity of the marginal sinus and a $2\frac{1}{2}$ cm. marginal zone, were correct, then the septa in all of the cotyledons which are in connection with the marginal zone or lie in its range could not have the significance which he attributes to them.

(H. SIEGMUND) FRANK McDOWELL, M.D.

Giuffrida, S. Transabdominal Puncture of the Uterus for the Diagnosis of Hydatidiform Mole (La puntura transaddominale dell'utero per la diagnosi di mola vescicolare). *Clin. ostet.*, 1949, 42, 249.

The hydatidiform mole very seldom betrays itself by the expulsion of vesicles, which is its pathognomonic symptom, and neither the quantitative evaluation of prolan in the urine nor x-ray examination, nor both of them combined give decisive results.

A new method of diagnosis was introduced by the French gynecologist, Aburel, who makes a transabdominal puncture of the uterus. Before operation the urinary bladder must be emptied, the skin disinfected, and the exact outline of the uterus determined. Local anesthesia is required. The walls of the abdomen and of the uterus are brought in close contact and a lumbar-puncture needle with a manometer is introduced perpendicularly into the cavity. If the needle's point is introduced into the cavity of a normal pregnant uterus, the fluid drawn out by means of a syringe will be amniotic liquor, whereas in the case of a hydatidiform mole more or less red blood will be withdrawn.

The author, agreeing with Aburel on the value of this method, employed it in 6 cases. In the first there was question of a five-month pregnancy—the woman was suffering from hemorrhage since the third month. There was no excessive excretion of prolan, and x-ray examination gave uncertain findings. By transabdominal puncture no amniotic liquor could be withdrawn, only blood. The diagnosis of a hydatidiform mole was confirmed by emptying the uterus, the mole weighed 800 gm.

The second case was that of a woman who was pregnant for the fifth time. The volume of the uterus corresponded to a pregnancy of the sixth month, but no fetus could be felt and no cardiac beats could be heard, although the woman asserted that she had felt movements of the child. There was an increased amount of prolan in the urine. X-ray examination without the use of a contrasting substance proved unsatisfactory. By transabdominal puncture pure blood was extracted. The woman left the hospital before undergoing the suggested operation, later, however, she spontaneously delivered a large mole.

The diagnosis was especially difficult in the third case. A pregnancy was indicated by the growing size of the uterus and incessant vomiting. Cardiac beats could not be felt. The prolan test was positive, but in transabdominal puncture the uterus reacted as a

pumpkin and no liquid could be extracted. Septic inflammation with spontaneous rupture of the uterus was eventually discovered at autopsy.

In the fourth case the positive result of the prolan reaction suggested a mole but the transabdominal puncture yielded pure amniotic liquor. Further development confirmed the existence of a normal pregnancy.

No details were given about Case 5.

Case 6 offered particular difficulties but pure blood was obtained by transabdominal puncture of a mole; there was however a question of abortion in a bipartite uterus with the needle having struck the septum.

According to the author transabdominal puncture of the uterus is a safe method for diagnosis if done by a skilled gynecologist. Though it cannot be expected to solve the diagnostic problem in all cases it may be of decisive value when other diagnostic means have failed.

NELD CASSETO

Page E W Patton H S and Ogden E Th Effect of Pregnancy on Experimental Hypertension *Am J Obst & G* 1941 4 53

To shed light on factors possibly concerned with the unfavorable influence of pregnancy upon human hypertension rats and rabbits with experimental hypertension were studied during pregnancy in pseudopregnancy with deciduas.

Blood pressures were measured in rats by the tail plethysmograph and in rabbits by the ear capsule method. Hypertension was induced by partial ligation of the renal arteries or in some rats by painting one kidney with collodion and removing the opposite kidney later. Deciduomas were induced by placing silk threads in the uterine mucosa during pseudopregnancy.

During pregnancy in normal rabbits the changes in blood pressure as shown by these methods were negligible. Renal ischemia produced during pregnancy was followed by hypertension but the onset was delayed until after delivery. Pregnancy produced an early fall in the blood pressure in all of 10 hypertensive rats and a less constant fall in 12 hypertensive rabbits. No untoward effects were observed. An increase of protein content in the diet caused sickness or death in hypertensive non-pregnant rabbits. Pseudopregnancy with deciduoma in all of 10 hypertensive rats caused a decline in the blood pressure corresponding roughly in time and extent to that caused by pregnancy.

These findings suggest that the fall in blood pressure observed results more likely from endocrine changes than from any action of the fetal kidneys. Doubt is thrown on the concept that a load on the maternal kidneys plays a significant part in the exacerbation of hypertension usually observed in human pregnancy. EDWARD L. COR. M.D.

GENITO-URINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Barney, J D , and Jones, G E Some Problems in the Management of Urinary Calculi *J Urol*, 1941, 45 1

Certain problems in the management of urinary calculi and some phases of the recent progress made are discussed by Barney and Jones

Early claims that Vitamin A deficiency is an important factor in stone formation have not been substantiated in the human being

Dietary factors are of very real importance In a group of proved cases of urinary lithiasis, 39 per cent of the patients had consumed excessive amounts of milk, cheese, or alkalis for a long period of time Such individuals develop phosphatic calculi In certain metabolic disturbances, as gout and cystinuria, stones may be formed One of the most important of these disturbances is hyperparathyroidism In 3 or 4 per cent of the authors' series of cases calculinuria induced by hyperparathyroid disease was present Certain drugs used either as acidifying agents or antiseptics, such as ammonium chloride or nitrohydrochloric acid, may also produce an excessive calculinuria

Persons bedridden for fractures may show decalcification of the skeletal structures with excessive calculinuria Added to this is the factor of stasis

Urinary-tract infection, especially with the urea-splitting organisms, are of special significance Certain organisms such as the bacillus influenzae, the staphylococcus, the streptococcus, and the bacillus pyocyaneus seem to have a selective affinity for invading the parenchyma of the kidney These strains which invade the parenchyma are practically always "urea splitters" On the other hand, the bacillus coli (urea splitting strains), the bacillus proteus, and, occasionally, the staphylococcus and the streptococcus produce stones in the pelvis or calyces

Of the cases which form the basis of this discussion, 46 per cent were infected with urea splitting organisms

Certain steps are outlined as of especial importance in the management of patients with urinary calculi

- 1 The dietary habits, especially in regard to food rich in calcium, must be ascertained

- 2 Careful and repeated cultures of the urine must be made

- 3 The calcium content of the urine must be determined A simple, easy laboratory test is presented

- 4 If a stone or stone fragment can be obtained, it should be subjected to careful chemical analysis This is of value in establishing the etiological factor and in indicating what diet restrictions are to be made, and whether an alkali or acid regime is to be recommended

- 5 Roentgenograms should be made, not only to indicate size, position, and number of stones, but also because the nature of the stone is at times revealed

The prognosis depends upon many different factors and varies with the etiology in each instance, and the type of infection

Some new phases in the treatment of urinary lithiasis are considered Operative and manipulative treatment are not discussed as the indications are so well known

The medical treatment consists of proper dietary measures In addition, the urinary-tract infection is relieved by proper therapy The difficulties and dangers of acidifying the urine are discussed

Fluids should be pushed to the point of tolerance The value of the modern antiseptics under proper conditions is pointed out A new therapy—dissolution of the stone—which has been successful in a few instances is mentioned

The importance and value of a stone clinic, both to the patient and to the surgeon, is emphasized

ANDREW McNALLA, M D

Uhle, C A W The Significance of Aneurysm of the Abdominal Aorta Masquerading as Primary Urological Disease Case Reports *J Urol*, 1941, 45 13

Experience with 5 cases of aneurysm of the abdominal aorta masquerading as disease in the urological tract is recorded Errors in the diagnosis and unnecessary exploratory operations are due to insufficient attention to details in the clinical history and incomplete roentgen interpretation

Urological complaints of a similar but milder type usually have been present for a number of weeks or months Pain is the chief symptom and usually results from a combination of factors, these are (1) displacement of the kidney and ureter by the ruptured or unruptured sac (2) hemorrhage into the perirenal space, (3) erosion of the vertebral bodies, and (4) pressure on the nerve root The pain is more intense and less effectively relieved by sedatives than that due to primary urological disease The pain is commonly referred to the testis, lumbosacral area, hip, thigh, and foot Pain of a boring or piercing quality indicates bone erosion or pressure on the nerve root Similar gastro-intestinal manifestations are found

Physical examination often fails to reveal the aneurysm, if made early or if the aneurysm is located in the upper part of the abdominal aorta When the sac ruptures into the retroperitoneal area death may occur within a few hours or may be delayed for days or weeks When small losses of blood occur at intervals the pain may simulate renal colic

The urological manifestations of the dissecting type of aneurysm are the most acute Hematuria and



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anuria from parenchymal damage is more often encountered in the type II. If rupture into the loin occurs and death is delayed calculus tumor or abscess can be simulated.

X ray exam: at on is of utmost value in making the diagnosis. The lateral or oblique view of the vertebral column bearing on the cupping is of great importance and no examination of the abdomen when aneurysm is suspected is complete without it. Retrograde urography will reveal the anatomical changes in the urinary tract.

In the surgical treatment, wing of the sac if ruptured is of distinct value in the amelioration of symptoms. If a lumbar surgical approach is employed on account of suspected urological disease and a blue mass is seen in the perinephric space it would be fatal to open it.

Exploratory operations are condemned

ANDREW McNALLY M D

BLADDER URETHRA, AND PENIS

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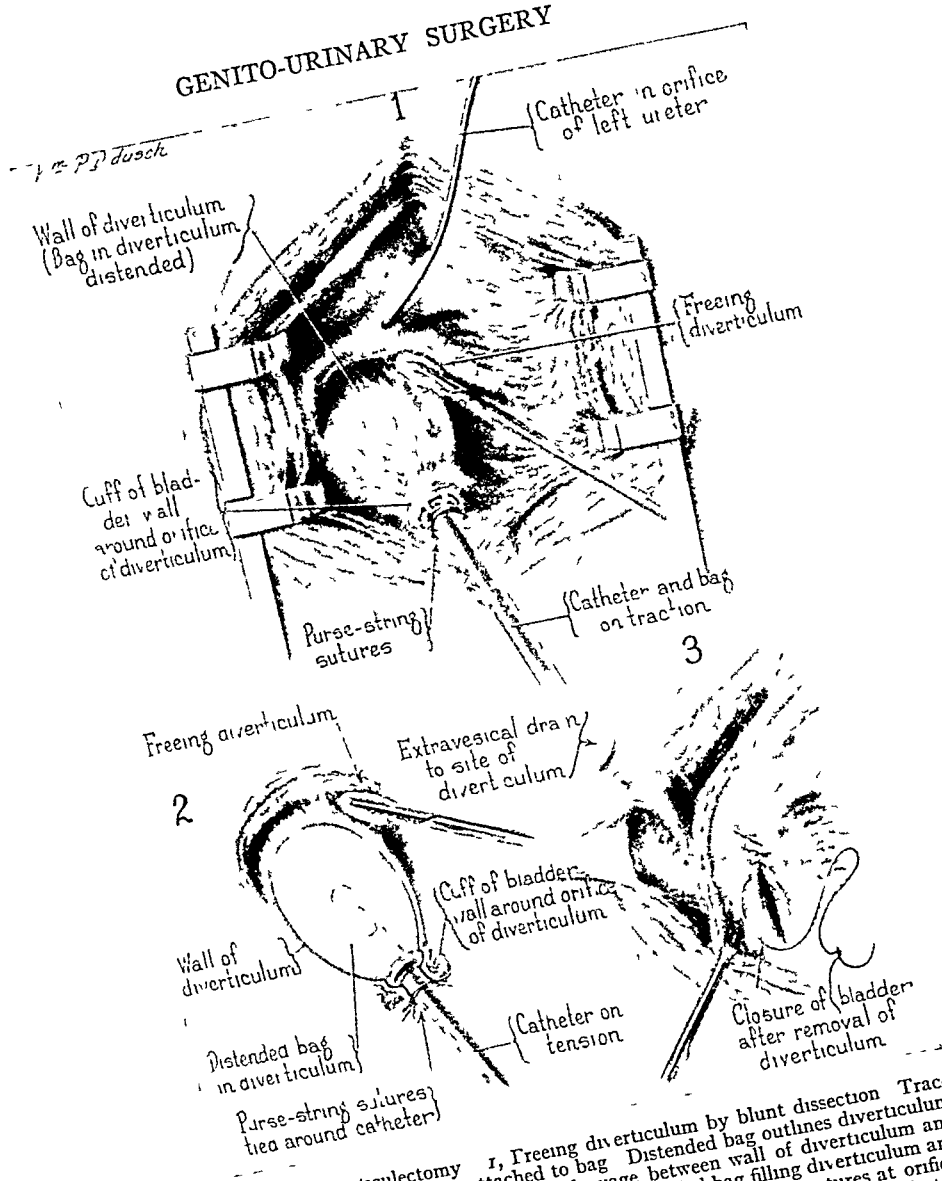
A forty-one year old woman had undergone 3 normal births. On May 17, 1934 termination of the fourth birth was accomplished by means of a high forceps. A vesicovaginal fistula has persisted since that time. As many as 4 operations have proved ineffective. Then in July, 1939 the woman came to the State Women's Clinic presenting the following findings: defects in the base of the bladder, the bladder neck and urethra. There was a vesicovaginal fistula about the size of a tablespoon with a prolapse of the bladder resembling tumor of the size of a small apple which extended out of the broad anterior vaginal wall. The first operation was carried out at the clinic on July 27, 1937 at which time the bladder fistula was closed by means of extensive mobilization and the uterus was interposed. The result was favorable to the extent that the capacity of the bladder amounted to 600 cc. and the patient remained comfortably dry. The vesicle opening was restored by means of an especially well constructed ostium of mucous membrane. The bladder neck and urethra were still unsatisfactory. At the second operation on March 15, 1938 the bladder neck was restored by means of a purse string suture around the perivesical tissues of the bladder neck and a functional and anatomical result was secured through a shelf of fat tissue in the bulbocavernosus. Moreover a portion of urethra was constructed. Although the patient showed no incontinence and managed to continue walking for three hours without leaking any urine yet there was a third and last operation on October 13, 1938 undertaken both because of the short and thin membranous portion of the urethra and her bladder complaints. The urethra was completely restored by the excision at the same time of a plastic operation of the bulbocavernosus and a penneorrhaphy. The final result was excellent. The urethral meatus was correctly situated and the urethra was about 3 cm. in length. Complete continence was obtained. The perineum was well supported and high. There remained only mild bladder complaints. Up until March 1940 it was possible to observe the satisfactory condition of the patient and she herself regarded the resultant condition as a complete cure. The success was obtained mainly through the employment of tissue for reconstruction which was taken from the vicinity of the bladder with interposition of the uterus and supported by means of a muscular tissue from both labia.

(HANS HEIDLE) H H Groc lvs MD

Council W A A New Technique for Diagnosis of the Bladder J L of 941 45 38

It is the purpose of this article to describe a new operative technique for division of the urinary

GENITO-URINARY SURGERY



bladder and to report a preliminary case. The technique is executed intravesically with the aid of a rubber balloon which envelops the end of a urethral catheter. The balloon may be made from finger cots, the fingers of a rubber glove, or from a special thread, gut, or a rubber band which is reinforced with rubber tape. The balloon is inflated with an ordinary atomizer bulb. Cystograms should always be made to predetermine the size and type of balloon used.

The usual suprapubic approach is made to the bladder, the peritoneum is reflected, and the bladder is opened and held with Young's self-retaining retractor. One or both ureters are catheterized if necessary, and the diverticulum is located. The balloon-tipped end is introduced into the sac partly inflated and the catheter clamped. A purse-string suture of No. 1 plain catgut is taken around the orifice, tightly tied to the catheter, and retied on the

opposite side. A second purse string suture running in the opposite direction is taken and tied in the same manner. This holds the balloon firmly in the diverticulum and thus facilitates dissection. The balloon is further inflated to fit the diverticulum snugly and the catheter is clamped at the distal end. An incision is made through the mucous and submucous coats 0.5 cm. from the purse string sutures and after encircling same the resection is carried out distal to the inflated balloon, the catheter being used as a tractor. After excision of the sac a Penrose drain is carried down to the cavity extravesically and then brought out through a stab wound laterally. The opening in the bladder is closed with continuous No. 1 plain gut and a Pezzer catheter is left in place for suprapubic drainage. The bladder is closed with continuous No. 1 chromic catgut and the muscles and fascia are closed with interrupted No. 2 chromic catgut. A small drain is left in the face of the rectum and the skin closed with interrupted black silk. J. H. A. LOEF, M.D.

GENITAL ORGANS

Silla, T. Fifty Cases of Incomplete Descent of the Testicle Treated by Hormones (Sungu, T. Ca. di. d. c. s. a. incompl. d. l. t. t. col. trattati. c. r. o. m. o. c.) *P. Med. Rom.* 94: 47, z. p. t. 450.

The results of orchopexy in the treatment of cryptorchidism are not always brilliant. Researches on hormones have demonstrated their effect on the testicles and the efficacy of medical treatment when they are undescended. A correlation has been noted between the pituitary gland and the gonads. Careful examination of the patients has shown various clinical manifestations of pituitary deficiency and in some also thyroid deficiency. Schloss and Gauni claim that the descent of the testicles in intra-uterine life is due to the pituitary hormones in the mother's blood as well as placental hormones of a pituitary

type. The deficiency in such hormones during intra-uterine life is the cause of cryptorchidism.

A. Chhaim and Zondek have demonstrated the marked influence of the extract of the anterior lobe of the hypophysis on sexual development. Aschner in 1912 demonstrated that ablation of the hypophysis is followed by atrophy of the sex glands. In 1920 Hirose demonstrated a sex gland stimulating hormone in the placenta and in 1926 Aschner demonstrated this hormone in the urine of pregnant women.

It is accepted by many authors that the pituitary gland produces two hormones which stimulate the gonads: an acid extract soluble in water, prolactin, and an alkaline hormone insoluble in water, prolactin. The extracts of the placenta and of the urine of pregnant are analogous to the hormones of the hypophysis. Of these hormones prolactin A has no effect on the male sex organs, prolactin B stimulates the growth and descent of the testes. Scharrer in 1930 was the first to cure cryptorchidism in man by the use of prolactin. These results have since been confirmed by numerous authors.

In 207 cases (67 per cent) of a series of 306 of cryptorchidism studied in the literature the author found that complete or incomplete cure had occurred. The age of the cured patients varied from twenty-one years. The total dose used for cure varied from 700 to 100,000 rat units.

The author then presents his own series of 50 cases treated with prolactin. The entire group is presented in tabulated form showing the age of the patient, the position of the testicles, the total dose used, the results obtained and the individual comments. Complete cure resulted in 29 cases (58 per cent) of this series; incomplete cure resulted in 7 cases and no improvement was obtained in 4 cases. In the successful cases the testicular secretion volume and the general condition of the patient included the psychic reactions improved.

J. CO. E. KLEIN, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC

Vogt, J H Therapeutic Measures in Osteomalacia and the Control of Their Efficiency *Acta med Scand*, 1941, 106 16

A very advanced case and a case of beginning osteomalacia are reported. In both the cause seemed partly to be inadequate nourishment, principally a deficiency in milk and in Vitamin D. Further pathogenic factors were an insufficient production of hydrochloric acid, a chronic gastro enteritis (in the first case a resection of the ventricle had been made), and an increased fat content of the feces.

In the first case it proved sufficient to give 200 gm of milk daily and 4,500 international units of Vitamin D. In the second case 1,000 gm of milk and the same quantity of Vitamin D did not prove sufficient. A satisfactory therapeutic result was obtained by giving 12,500 international units of Vitamin D and a large supply of secondary calcium phosphate. The use of this salt is recommended as it contains equivalent molecular amounts of calcium and phosphorus and is not so insoluble as the tertiary salt. The use of organic calcium salts is rejected for various reasons. Also hydrochloric acid was used because it probably aids the resorption of calcium.

As to the control of the therapeutic measures, x-ray examination is not sufficient as this method can reveal only grosser changes in the mineral content of the bones, and such changes cannot be expected in the first months. The use of balance experiments is recommended as such experiments can be carried out in the usual medical department on the condition that the content of calcium and phosphorus in the food is taken from tables. Repeated serum analyses may yield some information. The possibility of direct analysis of the skeleton by sternal trepanation is mentioned.

Brandis, H J von Subcutaneous Muscle Tears (Ueber subcutane Muskelrisse) *Deutsche Ztschr f Chir*, 1940, 253 639

The subcutaneous rupture of muscles rarely occurs from direct trauma. As a rule, it is brought about indirectly, often during athletic contests or training, especially if there is disproportion between capacity and taxation of the muscular tissue. Fundamentally, every skeletal muscle can be ruptured, but the frequency of this accident in a given muscle or group of muscles is different and depends on the amount of strain. In the extremities the muscles with strong bellies and relatively short tendons are especially liable to rupture, due to their strong and rapid contractions.

Within the last ten years 14 cases of ruptured muscles have been treated, 9 of which involved the biceps brachii and its long tendon, 2 involved the

extensor muscles of the thigh, and 3 the calf musculature and the Achilles tendon. Furthermore, some tears in the adductor muscles, in the extensor muscles of the thigh, and in the calf musculature have been observed, all of which were treated without hospitalization and were not included in this article. There were no sport injuries among the cases. In 4 cases a direct blow upon the muscle was stated to be the cause of the rupture, in the other cases the ruptures were caused by indirect violence. Most patients were between sixty and seventy years old. A man aged forty-seven had suffered 4 ruptures of muscles in different places and at different times. Without doubt his muscle tissues had been damaged by previous infections. Among the 14 cases there were 13 males.

The clinical picture is discussed thoroughly in accordance with the case histories. Smaller tears were treated conservatively without hospitalization. In 7 cases boric acid ointment and alcohol dressings were employed with good results. Larger ruptures were sutured (3 cases). If suture was impossible, the ruptures were treated by the "skinplastik" method according to Rehn. Great care was taken to restore the function, and good results were obtained in all of the patients.

(BODE) JEROME G FINDER, M D

Siegling, J A Growth of the Epiphyses *J Bone & Joint Surg*, 1941, 23 23

It is generally accepted that growth of the diaphysis occurs at the cartilage columns in the epiphyseal plate. Proof of this is in part due to proper interpretation of transverse lines observed in the diaphyses of long bones following the clinical and experimental administration of phosphorus. These radiopaque lines not only show the relative amount of growth occurring at the ends of long bones, but also prove beyond doubt that the shaft growth is the result of activity on the diaphyseal side of the epiphyseal cartilage.

Scant attention has been given the subject of growth of the epiphyses. Interpretation of radiopaque lines in the epiphyses as the result of disease or phosphorized cod-liver-oil medication presents proof that the growth of the epiphysis occurs by proliferation of the articular cartilage followed by endochondral ossification and that the epiphyseal cartilage (plate) is a negligible factor in longitudinal growth of the epiphysis if it contributes at all.

Photographs of roentgenograms are presented which show formations of semicircular phosphorus lines in epiphyses with subsequent epiphyseal growth limited to the juxta-epiphyseal side of the articular cartilage.

The convex surface of the radiopaque semicircular phosphorus line conforms roughly in contour with the juxta-epiphyseal outline of the articular cartilage.

and its base is adjacent and parallel to the epiphyseal line. Endochondral growth and ossification of the articular cartilage occurs everywhere except at the epiphyseal line (cartilage or plate).

Photographs of roentgenograms showing a surgically fused knee with considerable subsequent diaphyseal growth and no increase in the vertical diameter of the combined fused epiphyses is presented.

ROBERT P. MONTGOMERY, M.D.

Curtin A. Reflections on the Histogenesis of Bone in the Light of Studies of Delayed Consolidation (*Réflexions sur l'histogénèse du tissu osseux à la lumière de l'étude des états de consolidation*). *Proc. med. Pa.* 940 43 996.

For the examination of some 30 specimens from areas of delayed consolidation of fractures Curtin has used many different stains. He comes to the conclusion that the construction and regeneration of bone depend primarily upon the osteoblasts. There are two types of osteoblasts which can be distinguished by different stains. The first type fuses completely with the pre-ossseous substance and lose their nuclei; the second type retain the nuclei and become the true bone cells. There is a close relationship between the osteoblasts and the muscle tissue and especially the interfacial tissue and fluid. The osteoblasts the author believes receive their sustenance from the nucleus if muscle is absent or deficient; normal regeneration of bone is impossible. Local hemorrhages interfere with the regeneration of bone and consolidation of fracture. Chemically the author notes normal construction of bone proceeds most rapidly in areas where no iron is present. The question of the regeneration of bone cannot be studied by observation of bony tissue alone; the surrounding structures especially the muscles must be considered if the process is to be fully understood. Only in this way can certain problems of the orthopedic surgeon be solved.

ALICE M. MEYERS

Smith A. DeF. Congenital Elevation of the Scapula (*Arch. Surg.* 1941 4 39).

Because the upper limb of an extremely young human embryo lies in the cervical region and migrates to the normal adult location during the period between the ninth and thirteenth weeks of development it is evident that congenital elevation of the scapula originates at a time when it is conceivable that external pressure could be any factor in its production. Evidence gathered from both comparative anatomy and embryology indicates that this is not infrequently associated with bony masses connecting the scapula and cervical vertebrae is analogous to the suprascapular bone of the lower vertebrates. In these lower forms the suprascapular bone is occasionally a rigid connect on between the scapula and the spine.

In 14 patients a connection was found between the high scapula and the spinal column. This may be of considerable importance in limiting motion of the

arm or in interfering with efforts to lower the scapula. Associated congenital deformities of other parts of the body were present in 27 of the 50 cases that were studied which tend to confirm the thesis that a high scapula is a true congenital deformity. Of these additional congenital deformities vertebral maldevelopment in the cervical and upper thoracic region was most frequent.

Operations are not believed to be warranted if the functional and cosmetic defect is slight. With marked limitation of abduction due to the presence of an omovertebral bone function may be improved by excision of the bone. Severe deformity may require a complete release of the scapula and retention of the bone in a lower position by fixation to a rib. Neurological complications have been reported following this procedure.

Operation was performed on 14 of the 50 patients and the procedures used were classified into three groups:

1. Simple excision of the omovertebral bone or fibrous band without extensive release of the scapula or any serious effort to lower it.

2. Extensive subperiosteal dissection of the scapula from its attached muscles; removal of the omovertebral bone if present and excision of a large portion of the capula in lifting the process of the bone above it but with any attempt to anchor the capula in a lower position.

3. The procedure just outlined with retraction of the capula to a much lower level with suture to a rib. Only a small portion if any of the prapraspinous portion of the scapula is excised here or on such occasions.

H. MEYER, PH.D., M.D.

Hipps H. E. Muscle Pathology in Anterior Poliomyelitis: Its Relation to Function. *South. M. J.* 94 34 35.

It has long been considered that if a partially paralyzed muscle has had adequate rest, baring and physical therapy for a period of two years or more, that muscle has had the maximum treatment. No further increase in strength can be expected and operative procedures to replace that muscle's function are then indicated.

By means of a grant from the National Foundation for Infantile Paralysis an intensive study of the gross and microscopic pathology of poliomyelitic muscles was made. As a result of this study it was found that many of these muscles could be further strengthened by an operative procedure on the muscle itself; an increase of its intrinsic power being produced.

The primary impetus for this study, as furnished by the dissimilarity in size of a child's paralyzed legs. Both children were the same size and both had the right leg paralyzed but in one the leg was nearly as large as the normal leg, whereas in the other the leg was thin, shrunken and markedly atrophic. In both children, however, the muscles all graded zero and the foot was entirely flail. Later at operation when a biceps femoris transplant was made to the

patella on a patient whose quadriceps graded only a trace, the muscle was visualized. In this case it was easy to see why a contraction of the muscle belly itself would be ineffective. The pull was simply on the intervening fibrofatty mass and was not transmitted to the patellar tendon, yet there lying within that muscle belly above the fibrofatty zone was enough power to function almost normally in the leg, if the power could be utilized.

This study was carried on by making observations at operation on cases of postpoliomyelitis of two or more years' duration. During the course of a standard operation the skin incision would be lengthened and full inspection of the muscle made. A description was dictated to a secretary and sketches and photographs were made. The muscle was also tested by mechanical stimulation for its ability to contract, and its elasticity and degree of tension were noted. Microscopic sections were taken from various areas.

The gross or microscopic changes that occur in the later stages of poliomyelitis of the muscles are atrophy, degeneration, fibrous replacement, and fatty replacement. All of these pathological phases occur in almost every muscle, but the degree of change varies so much that one muscle may show predominantly an atrophic change and another a fibrous replacement, or some other type of change. Classification was made on the basis of predominant microscopic change as follows:

- 1 Homogeneous atrophic and degenerative change
- 2 Muscle replacement change
 - a Fibrous
 - b Fatty
 - c Fibrofatty
- 3 Irregular atrophic and degenerative change

The homogeneous atrophic and degenerative change is the most common pathological involvement found. The muscle is uniformly diminished in size and is homogeneous in color and general structure which gives the appearance of a very atrophic flabby structure. The muscle usually contracts when pinched, but feebly. It most often retains some elasticity and is usually graded as poor or showing only a trace of power.

Muscle replacement is the least common type of change. The muscle is definitely smaller than normal. The color is almost uniformly gray or yellowish gray. It seems to be almost completely replaced by fibrofatty tissue. In some muscles this change is predominantly fatty and in others it is predominantly fibrous, while in others there is a rather homogeneous fibrofatty appearance. They will not contract when pinched and they have no elasticity. They will stretch, but when stretched, they will not return to their former length. They usually grade "zero."

The irregular atrophic and degenerative change is second in frequency. It involves only the larger muscles. There is no uniformity in color, shape, size, or degree of atrophy and degeneration in these muscles. This lack of uniformity allows advantage

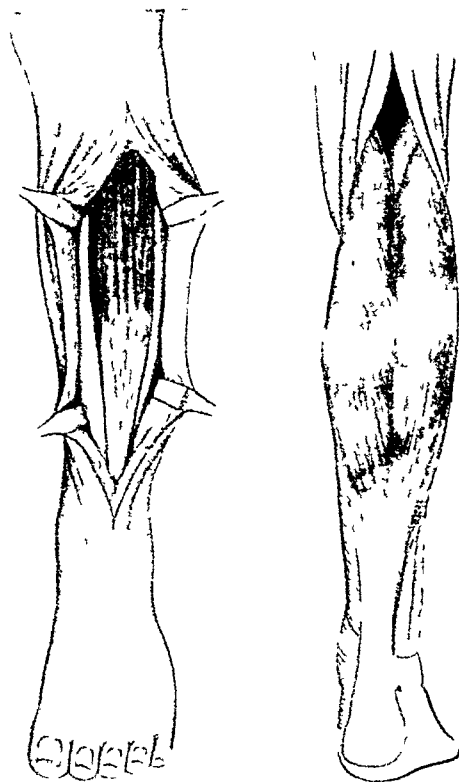


Fig 1, left Muscle grade, fair plus. There is a zone of degeneration about the musculo-tendinous junction. The muscle above is good. Contraction is ineffective because of a loose, weak lower zone which stretches and does not transmit pull to the tendon.

Fig 2 Muscle grade, poor. There is a zone of fibrofatty degeneration across a fairly good muscle. A contraction in either muscle belly is ineffectual because of this zone. This may have resulted from a stretch tear or perhaps from the pressure of the calf band of a brace.

to be taken of their peculiar pathological structure to increase their strength by a surgical procedure.

In this group it was found that the degenerative and atrophic change was often definitely localized. When found in the region of the musculotendinous junction (Fig 1) this area was stretched but contraction of the remaining muscle was permitted, which thus rendered the contractile power less effective or interfering with the transmission of the pull to the tendon by the interposed fibrofatty tissue. Localized areas of fibrofatty tissue were also found in the belly of a muscle, and if large enough this intervening zone would eliminate transmission of the impulse from the upper segment and make contraction of the lower segment less efficient because it was not firmly fixed above (Fig 2).

Speculation on the origin of this zone is interesting. It may be a tear in the muscle that occurred in

the early stage when the patient tried to walk too soon. It is not likely that such a tear occurs suddenly with dramatic violence so that the patient can remember when it may have occurred. A stretching out or stretch tear localized at one zone is growing greater with each attempt to overuse the muscle in the most likely mechanism.

Because of the presence of this zone in areas of fairly good muscles in such regions as to render function less effective various operative procedures have been suggested such as excision of the fibro fatty area and rupture of the muscle or reinforcement of this area with sutures of fascia lata. Because of the multiplicity of the problems that would present themselves no special operative procedure is advocated. It is believed that elimination or reinforcement of this area is of the greatest importance and that many muscles which had previously been considered as reaching their maximum degree of recovery can be further strengthened by a properly executed surgical procedure.

The author's end results have been too few for proper evaluation but he states that 50 per cent of his patients that have been operated on have shown a definite increase in muscular strength.

F HAROLD DOWLING M.D.

Graff U Die se of the Sacro Iliac Joints with Particular Consideration of the Inflammatory Diseases and Their Origin (C L R a k g d e l l e k r a l g e m i t b s d r e B e r u c k c h i g u d e e z n d l e E L k n g n u d b r F n t t h u g l B t z k l C k 194 7 6

The close relations of the psoas muscle and the parts of the lumbar plexus which are separated only by the thin joint capsule of the joint space are anatomically significant. The proximity of the autonomic nervous system and the compact apposition of the rectum along the left sacro iliac joint are also important. The clinical symptoms of diseases of the sacro iliac joints fall into two groups: (1) inflammatory nervous manifestations which generally lead to a diagnosis of sciatica and (2) signs in the region of the lumbosacral plexus and (2) situate disturbance with limitation in the position of the rigidity of posture and lumbar scissos with convexity toward the well side. Tenderness of the joint may be elicited quite frequently by vaginal or rectal examination. Additional symptoms include pain on hyperextension on crossing the leg in the sitting position and with each change of position painful limp and stiffness of the hip in walking. Diagnosis by means of the roentgenogram is difficult because of the many variations which occur in account of the oblique plane of the joint from behind medially toward the anterior and lateral aspects. Negative findings are of no significance. Traumatic lesions such as isolated subluxation or association with pelvic fractures are seldom recalled. The joint may participate largely in Bechterew's disease periodical proliferation due to lymphogranuloma may involve the area and produce honeycombed densities

of the adjacent bony parts. Osteitis fibrosa and deformans affect the joint. Sacro iliac tuberculosis which generally occurs between the ages of twenty and thirty five is practically always secondary especially to diseases of the female sex organs particularly during pregnancy. The primary focus involves the anterior superior of the sacrum in 61.8 per cent and the posterior superior in 38.2 per cent. Roentgenograms in large destructive foci often are insignificant just as the clinical manifestations at the onset later sciatica painful limp fever debility the positive Trendelenburg sign or gravitational abscesses give the first evidence leading to a diagnosis and a recognized cause of the disease. In indefinite sacral pains the sacro iliac joints should be thought of more often. Osteomyelitis of the ilium attacks the joint in practically every case whereas osteomyelitis of the sacrum practically never spreads to the joint. Perforations occur especially along the iliac or along the rectum and not infrequently through the acetabulum into the hip joint. Only early radical treatment can bring healing to most of the severe septic cases.

Infectious arthritis was observed in the course of polyarthritis but also in the most varied infections of other types such as group scarlet fever typhus sepsis measles smallpox diphtheria syphilis and actinomycosis. Gonorrheal sacro ilitis generally runs its course without destruction of the joint foci of infection are not infrequent. A second group of inflammatory lesions having local origin have thus far been described infrequently during the puerperium traumatic lesions are rarely produced especially in the left sacro iliac joint (tears of fascia of the capsule hemorrhage and avulsion of the peritoneum). Nevertheless localization of a suppurative process in the internal genitalia is rare. In definite cases of disproportion between the head and the widest part of the pelvis a severe phlegmonic inflammation of the sacro iliac joints and of the pelvic connective tissues was observed during the puerperium in association with a spreading apart of the three pelvic articulations. Vaginal tears were discovered as the points of exit of the infection. Other cases from Schmieden's Clinic which were observed to have a predilection for the left joint following resection for carcinoma of the rectum (3 cases in 1000) also belong in this group of cases of inflammatory sacro iliac arthritis. After a smooth course immediately after operation a sciatic type of pain developed in these cases which was followed by fever leucocytosis and localized edema of the soft tissues in the vicinity of the joint finally quite late destruction and a kyphosis were recognized. Entgegenlogically all 3 cases healed in several months without surgical intervention. Despite all aseptic precautions during the resection of the rectum as in all open wound cases and despite a smooth course of wound healing and closure of the retained rectal stump infection of the joint ensued. The author attempts to explain this on the basis of a damming back of wound secretions and infected

mucous material. Nevertheless, he advises against a primary resection of the descending portion of the sigmoid, since this would increase the danger of the complications mentioned above. The pain of this disease is unbearable despite antipyretics and morphine. Diathermy may be used in early cases. Early functional treatment is recommended to combat the accompanying severe atrophy involving the skeletal musculature.

(SIEVERS) JEROMI G. FINDER, M.D.

Lenggenhager, K. Concerning the Genesis, Symptomatology, and Therapy of the Subluxation Symptoms of the Knee Joint (Ueber Genese, Symptomatologie und Therapie des Subluxationssymptoms des Kniegelenkes). *Zentralbl. f. Chir.*, 1940, p. 1810.

As the result of a heavy blow against the outer side of his right knee the author's patient had a markedly weak knee, which indicated an injury of the medial lateral ligament, and, moreover, a definite forward subluxation, so that a tear of the cruciate ligament had to be considered also. However, operation showed only a completely torn mediolateral ligament. The cruciate ligaments were uninjured.

Because of this, Lenggenhager investigated the conditions in more than 80 fresh cadaver knees and came to the conclusion that not the injury of the anterior cruciate ligament but the injury of the medial lateral ligament produced an anterior subluxation. The anterior cruciate band runs from behind, above, and outside to a point in front, below, and within and is first put under tension only in full extension. It can be divided without producing subluxation of the knee. The posterior cruciate band runs from above, within, and forward to below, behind, and outward and shows its greatest tension in flexion of the knee joint and its greatest relaxation in extension of the joint. The separation of this ligament produces in the normal knee bent at a right angle a marked posterior subluxation. Such an injury seldom occurs since the posterior cruciate ligament must first be stretched by greater flexion and in such a position the knee can only rarely be affected by gross violence. However, further investigation showed that subluxation less than 1 cm. indicated an injury of the structures of the medial portion of the capsule, but with subluxation over 1 cm. an injury of the anterior cruciate ligament was also likely. If the mediolateral ligament were cordlike it could prevent neither an anterior nor a posterior subluxation, but since it is fan-shaped and runs from the tibia to the middle point of rotation of the femoral condyle, it is able to prevent this occurrence because its anterior fasciculus of fibers acts as a check. Besides preventing the forward subluxation the mediolateral ligament prevents the symptoms of weak knee seen in injuries of this ligament and increased outward rotation of the lower leg. If such signs are present and, moreover, incarceration of the meniscus appears, then the lateral ligament is torn.

In such injuries, but also in simple traumatic relaxations Lenggenhager proceeds to operate under spinal anesthesia, local anesthesia is avoided. He has constructed for this purpose a special pair of compasses to estimate the central point of rotation in the femoral condyle and a rust-proof nail from 2.7 to 2.9 cm. long and 1.3 mm. thick. Silk cord 1 mm. in diameter is also used. After determining the length to be used this silk should be held under slight tension during its sterilization in one-tenth of 1 per cent mercury-oxycyanate so that it does not shrink after submerging it. With the knee bent at a right angle, a curved incision is made along the patella over the joint space. The skin flaps are dissected together with the subcutaneous fat down to the fascia, and a longitudinal incision of the fascia is made over the joint space. Blunt dissection of the fascia is used to show definitely the lateral ligament, and the point of rotation of the medio-femoral condyle is estimated. Transverse division of the lateral ligament and capsule is then done to inspect the joint with the relaxation thus produced, the mediolateral ligament being sewed with excision of the edges for from 3 to 8 mm. in cases of necessity, and the nail is inserted in the central point of rotation. The first silk check rein is applied parallel to the joint space by passing it through the periosteum of the head of the tibia, pieces of silk of the same length are fastened to the periosteum, and the second silk check rein is applied in the same manner somewhat further forward on the tibia preparatory to fastening the cord over the nail without knotting it. The position of the nail is then examined, and the nail is driven in deeper, the silk cord is knotted and fastened by running transverse catgut sutures in order to produce scarring with the underlying tissues more quickly and intimately, then fascial suture and skin suture are made, and the knee, flexed to a right angle, is mobilized with adhesive tape. After the first day the knee should be moved passively with care and in the first week the movement should be from 10 to 15 degrees over and under a right angle. After three weeks the patient stands with a longitudinal support of starch bandage. After seven weeks reckoned from the time of operation the support is removed. In this manner 12 patients have been operated upon, in 9 with good results and in 3 with moderately good results.

(PLENZ) JOHN R. PAINE, M.D.

Milone, S., and Midana, A. Recurring Hydrarthrosis of the Knee Due to the Virus of the Disease of Nicolas and Favre (Idrartro recidivante del ginocchio da virus della malattia di Nicolas e Favre). *Minerva med.*, 1940, 31: 519.

Only 37 cases of pyodermitic (lymphogranulomatous) arthritis are reported in the literature. They show that the disorder involves one or several joints, has a preference for the knee or the hip, and appears suddenly and has an acute or subacute course with rapid resolution, or becomes recurrent or chronic. Cases with an essentially chronic course

seem to be extremely rare. The disorder attacks both sexes equally and is more frequent in adults. The articular effusion is rather slight and may be serous, seropurulent or purulent. Roentgen examination shows usually intact exceptionally decalcified articular surfaces which are somewhat separated. As a rule the joint returns to normal under adequate treatment. The diagnosis should include attempts at demonstrating the specific antigeric activity of the articular effusion. The disorder may be the result of a secondary or of the only localization of the virus.

The authors report a case of recurring hydrarthrosis of the knee in a woman with poradenitic anorectitis in whom the history and the clinical and laboratory findings did not leave any doubt about the specific nature of the arthropathy. In fact the proctitis was associated with a strongly positive Frei test and the articular fluid which was negative when injected intradermally in lymphogranuloma patients gave a positive result when used after considerable concentration (4 to 1). This observation explains the apparent absence of active substance in the articular fluid when the latter is abundant as in hydrarthrosis. Other notable aspects of this case are the recurrent character of the arthropathy which is very seldom encountered, the occurrence of two attacks in one knee and of one in the other, the latter appearing immediately after an intradermal Frei test and the simultaneous appearance of lesions of polymorphous erythema. RICHARD KEMEL M.D.

Shanlin A. P. *The Clinical Picture and Treatment of Synovial Tumors*. New York 1940 46 pp.

Synovial tumors originate in tendon sheaths, bursae and articular capsules. They may be divided into two groups: giant cell tumors and malignant tumors also called synoviosarcomas or synovialomas. In the first group in addition to giant cells also spindle, polygonal and so-called xanthomatous cells containing cholesterol are found.

As to the histogenesis of the tumors of the tendon sheaths they are found in peripheral portions of the neoplasms collagenous fiber bands resembling tissues of which tendons are built. The development of giant cells was ascribed by several writers to a disturbance of the histosterin metabolism but attempts to provoke a formation of xanthomas by hypercholesterolemia and trauma failed. The author maintains that an excess of cholesterol as well as trauma is only a contributing factor to the pathogenesis of giant-cell tumors.

As a rule the tumors grow very slowly and do not annoy the patients greatly and therefore usually one or even a few years elapse before a physician is consulted.

The majority of the tumors are located on fingers and toes. Tumors of the fingers usually have a benign course while those of the feet show a tendency toward recurrence and necessitate repeated frequently deforming operations. Tumors of the palms

and forearms are less benign than those of the fingers but less malignant than those of the feet. Not infrequently an exudate appears in the affected articulation on superficial veins become enlarged and the local temperature rises. Roentgenograms do not show any obvious changes but the tumor itself may cast a shadow. Pains may be absent. Metastases are rare. A differential diagnosis between tumors and tuberculosis of the joints may be very difficult. Tumors originating in bursae must be differentiated from inflammatory processes while neoplasms of the tendon sheaths may be mistaken for sarcomas of the muscles.

The author treated 17 patients with synoviosarcomas. Six had giant cell tumors which were removed. The remaining 11 patients had malignant tumors and in the majority of cases were treated surgically. In the first mentioned group all patients were alive from one to ten years after the operation while in the second group only 6 were alive from a few months to seven years after the surgical procedure. All tumors were removed together with the capsule.

JOSEPH K. SARAT M.D.

SURGERY OF THE BONES, JOINTS MUSCLES, TENDONS, ETC.

Blum L. *Partial Myotomy in the Treatment of Divided Flexor Tendons of the Hand*. Ann. S. 1941 2: 3460.

Tens on at the site of repair is one of the factors responsible for poor results following division of the flexor tendons of the hand.

A simple method of myotomy consisting of simultaneous division of the tendon prolongation at a selected site in the forearm is proposed as a corrective procedure.

The position of acute fixed flexion following tendon sutures rests the muscle and decreases its tension but it does not obviate the pull at the suture line. This fact is amply demonstrated by the very real tension invariably found as divided flexor tendon ends are approximated while the patient is under complete anesthesia. Despite an immobilizing plaster splint normal muscle tone exerts its continuous pull on the suture line during the entire postoperative period. This is considerably more marked with flexors than with extensors because of the preponderant muscle bulk of the former normally expressed by a fixed attitude of the relaxed hand.

From the viewpoint of function the tendon is merely a cord transmitting the muscle pull. The result of muscle injury such as laceration differs markedly from that of tendon. The former has a rich blood supply, healing promptly with minimal loss of strength. The highly contracted scar in a muscle belly does not seem to interfere with its subsequent function, a demonstrable fact in any extensively lacerated wound of the extremities.

The flexor muscles of the forearm are of the unipennate type with the tendon prolonging throughout

the length of the muscle. Hence, division of the muscle which includes the tendon-prolongation results in a loss of contractile power, the degree of which bears a direct relationship to the site of division. Since this point in the 2 cases reported was selected at the junction of the distal third with the proximal two-thirds of the muscle, it is apparent that only the fascicles in the distal third were able to exert any pull through the tendon. As the muscle wound healed, uniting the divided portions of the muscle and the divided ends of the tendon-prolongation, the muscle power returned so that, as in the first case, the patient regained more than two-thirds of the muscle strength within nine weeks of the time of operation. The myotomy wound evidently healed *pari passu* with the repaired tendon so that during the second month of convalescence the muscle power rapidly returned at a time when the tendon was once again able to bear the full stress.

There are two additional advantages to this procedure. First, following the myotomy the interval between the divided tendon ends is diminished by an actual transposition of the tendon because of the gaping of the muscle wound. This amounts to at least $\frac{1}{2}$ in., and serves to allow approximation of the tendon ends in addition to the main purpose of relieving the tension on them. This may be of use in secondary tendon surgery as a substitute procedure for the grafting of short, free tendons. Second, following the procedure it is possible to place the hand and finger in a neutral or slightly flexed position. This is of real advantage during the period of convalescence since it is far easier to regain normal function in a finger so placed than in one that has been coiled up in the most acute flexion for a month postoperatively.

Two case reports are presented in detail with preoperative and postoperative photographs of 1 of the cases.

ROBERT P. MONTGOMERY, M.D.

FRACTURES AND DISLOCATIONS

Urist, M. R., and McLean, F. C. Calcification and Ossification. Calcification in the Callus in Healing Fractures in Normal Rats. *J. Bone & Joint Surg.*, 1941, 23, 1.

This article presents the results of histological observation of the progress of calcification in the healing of experimental fractures in rats. The study shows that the new osseous tissue is calcifiable when it is laid down, and that under optimum conditions a preliminary stage of uncalcified osteoid is not typical of bone formation in the callus.

The healing process in the fractures observed is essentially one of formation of a fibrocartilaginous callus in and around the defect in the shaft, and the subsequent invasion, removal, and replacement of the fibrocartilaginous mass by new bone arising from the cambium layer of the periosteum and from the endosteum.

Bone matrix is formed subperiosteally and subendosteally, first at some distance from the fracture

line, at about the second or third day following a fracture. It is calcified as it is laid down under optimum conditions with no appreciable interval between its formation and the deposition of bone salt within it. As the new bone invades the fibrocartilaginous callus, it removes the fibrous tissue, fibrocartilage, and hyaline cartilage, and replaces them with bone matrix. In this process remnants of the invaded tissue may be utilized and converted into bone matrix by the invading osteogenic cells. In all instances the new matrix is calcifiable as soon as it is recognizable as osseous tissue.

A lag in calcification of newly formed osseous tissue may occur. This is attributed to failure in the supply or transport of bone minerals, rather than to lack of ability of the bone matrix to calcify.

The matrix of hyaline cartilage becomes calcifiable when the adjacent cartilage cells become vesicular or hypertrophic. The calcification of cartilage matrix is further conditioned by its relationship to the bone tissue invading the fibrocartilaginous callus. Only matrix in contact with the invading bone calcifies, and, if the matrix has not been made calcifiable by hypertrophy of the adjacent cells, it calcifies only when converted into bone matrix by the advancing osteogenic process.

Only tissues recognizable as bone matrix or cartilage matrix calcify in the callus. There is no random calcification in the fibrocartilaginous callus, the great mass of which remains completely free from bone salt except where it is invaded and converted into bone from its periphery.

Particles of bone, including their bone salt, have been demonstrated in foreign-body giant cells and in macrophages during the resorption of necrotic bone. Fragments of dead cortical bone have been observed to undergo decalcification in advance of the disintegration of the bone matrix. This differs from the process of resorption of living bone, in which the bone mineral and organic matrix are removed simultaneously. No phagocytic activity of osteoclasts, either for particles of bone or for bone salt, has been demonstrated.

The authors have made no effort to prove or disprove the origin of bone from the osteocytes of the compact bone, but have not seen evidence that this was possible under the conditions of our experiments.

Detailed diagrammatic representations, photomicrographs, methods of tissue fixation, and preparation of the experimental material is presented.

ROBERT P. MONTGOMERY, M.D.

Willard, DeF. P., and Nicholson, J. T. Dislocation of the First Cervical Vertebra. *Ann. Surg.*, 1941, 113, 464.

Dislocation of the first cervical vertebra is the partial or complete loss of contact of the inferior articulating surfaces of one or both lateral masses of the axis with the corresponding superior articular facets of the epistropheus. The dislocation may be anterior, right or left rotary, posterior, and right or left lateral. A fracture of the odontoid generally ac-

companies the latter two types and traumatic dislocations are frequently associated with a fractured odontoid

Dislocation may result from trauma infection paralysis or congenital defects

Infection is rarely found in the vertebrae it is usually in the surrounding tissues Following such infections as adjacent cervical sinusitis pharyngitis tonsillitis mastoiditis adenitis or dental abscess the ligaments supporting the atlas on the epistropheus become relaxed and permit a spontaneous dislocation Bone decalcification and joint involvement may follow these infections The vertebral bone may be destroyed by pyogenic tuberculous or syphilitic osteomyelitis

The diagnosis indicated by a few constant symptoms and signs and the verification of the diagnosis is determined by the roentgenogram The head is held in a torticollis position The chin frequently held tightly against the larynx It is often difficult to open the mouth Dysphagia a voice change may be observed Pain is in the occipital and mastoid areas because of the region served by the second cervical nerve These areas are tender to touch Motion particularly extension increases the pain The subject lies supporting the chin in his hands On attempt of cervical motion gratifying of the neck is experienced This may be audible to the examiner The head can be laterally flexed but only slightly from the side to which it is tilted The chin cannot be rotated past the midline in the attempt to correct the rotational deformity so that the subject must turn his entire body to see over the opposite shoulder Posteriorly the paraspinal muscles are prominent on the side to which the chin rotates This prominence is accentuated if any attempt is made to straighten the head If the mouth can be opened the pharyngeal bulge on the side to which the head is tilted Paralysis is relatively infrequent in the cases surviving the force produced by the dislocation When present however it is more common in the arms Sensation may be retained as the pyramidal decussation lies directly behind the odontoid

The absence of neurological findings could account for mistaken diagnoses of pharyngeal abscess and cervical arthritis while less frequently the delayed and gradual onset of neurological symptoms would be confused with cerebellar tumor syringomyelia bulbar palsy and myasthenia gravis Neurological complications are infrequent however

The dislocation should be reduced as soon as possible after recognition Dislocations of the first cervical vertebra can be successfully reduced spontaneously with the head hanging dependent unless they are posterior dislocations or if neurological complications are present This method is not adaptable for posterior dislocations of the first cervical vertebra which are accompanied by fractured odontoid as theoretically the deformity would be increased and cord compression could result Caution is indicated in its immediate application after traumatic dislocation which edema of

the cord would cause a further paralysis In treating fractures of locations in other regions of the cervical spine by this method it was learned that children tolerated it better than adults An uncomfortable complication in adults was edema of the scalp

Two or three short mattresses are placed on the fracture bed The head is gradually extended farther over the end of the top mattress for the first twenty-four to forty-eight hours until the subject's shoulders rest on the edge of the mattress The head then hangs free for another twenty-four to forty-eight hours The subject is held in position by applying Buck's extension to the legs and raising the head of the bed When rotation and lateral flexion of the head are free and equal in both directions reduction has been accomplished The reduction is checked roentgenologically simply by transferring mattresses and child with head hanging over the end onto a stretcher and transporting him to the roentgenographic department if no portable apparatus is available Roentgenograms are taken without disturbing the position of the head by holding a cassette on the side of the neck for the lateral view and with the cassette in back of the head for the anteroposterior view

Reduction is maintained by a plaster bandage from and including the head to the pelvis The method of applying the plaster bandage is to transfer the patient from the mattress without supporting the head so that his back rests on the canvas sling of an Abbott frame and the head hangs dependent A body jacket is then applied As this dries a table of suitable height is pushed beneath the patient The canvas sling is released so that the table supports the patient's trunk The Abbott frame and sling of canvas are then removed A four-mulin bandage with a longitudinal slit in its midpoint on which will permit it to be slipped over the patient's head to rest beneath the chin and occiput is arranged so that the end may be tied behind the operator's back In this way the operator can exert traction and control the amount of extension of the neck The extension which occurs in the occipital flexion is not necessary and not desired as it will flex the subject's head looking backward The head encasement is then applied over the traction bandage which can be withdrawn after the head and body parts of the plaster cast are joined together

Six cases of dislocation of the first cervical vertebra the patient ranging from three to sixty years of age are reported after observation from one to four years Three patients had a traumatic history which was associated with a fractured odontoid Three had spontaneous dislocations following gross cervical motions in the cervical region One with a fractured odontoid had posterior dislocation Two had anterior dislocations One with spontaneous dislocation had anterior dislocation with spontaneous dislocation had otitory displacement to the left and the other to the right No patient had any neurological disturbance from the dislocation All except the posterior dislocation were

reduced spontaneously with the head hanging dependent. Reductions were maintained by a plaster-of-Paris bandage, including forehead and pelvis, for three months if the dislocation was associated with a fractured odontoid, and for four months if it was spontaneous. A Thomas collar was used for six additional weeks. There were 2 complications. One patient, with delirium tremens, was uncooperative, reduction could not be maintained by plaster fixation, and death resulted from pneumonia. The second patient had 3 recurrences in fifteen months, each time after mechanical fixation was discontinued. This patient underwent 2 surgical attempts to maintain reduction. The second surgical procedure which consisted of wiring the posterior arches of the first and second cervical vertebrae and a spinal fusion has remained successful for twenty-one months, with no external fixation for seventeen months.

A recurrence of a dislocation after the described care requires operative fixation.

ROBERT P. MONTGOMERY, M D

Clark, W. A. Fractures and Dislocations of the Cervical Portion of the Spine, with a Review of 89 Cases. *Arch Surg*, 1941, 42: 537.

Fractures and dislocations of the cervical vertebrae represent only about 0.5 per cent of all fractures. In the series comprising this report, the majority of the patients (50.5 per cent) were between twenty and thirty-nine years of age and males greatly predominated (79.7 per cent). As in other types of fractures, automobile accidents were responsible for the largest number (57.9 per cent), with a variety of other factors completing the list of causes.

A bilateral dislocation was commonly indicated by hyperextension of the neck. Contralateral tilting of the head and rotation of the neck suggested a unilateral dislocation. Deformity was not always associated with the fracture, but pain, while not a prominent complaint, was marked with motion of the head or neck.

The symptoms varied according to the level of the lesion. This relationship is well shown in Table 3 of the original article. In general, however, unconsciousness was most frequent (35.2 per cent) and paralysis and anesthesia followed in the order given, with an incidence of 26.1 and 21.5 per cent, respectively.

Injuries were present in 43 per cent of the group, dislocations occurred in 31 per cent, and combined fracture and dislocation were seen in 22 per cent of the series. Almost one half of these lesions involved either the fifth or sixth cervical vertebra.

The relationship of the level of the lesion to neurological signs was of considerable importance, inasmuch as in lesions below the fourth cervical vertebra, anesthesia, paralysis, or both were present in a high percentage of the cases. In view of this fact the author recommends emergency head traction in extension and early efforts at reduction in order to avert severe and permanent paralysis as

much as possible. Movement of the patient should be minimal, for injudicious changes in position occasionally result in sudden death.

The early application of extension is stressed and early laminectomy is recommended. Laminectomy should be performed on the patients with complete paralysis but who are without roentgenological evidence of impingement on the neural canal, since subdural edema can simulate cord division, and this may be relieved by incision of the dura.

Slightly over one-third of the patients were treated by extension and an ambulatory cast or brace. A cast only was used in 15.9 per cent and manipulation followed by a cast was the method of treatment in 6.8 per cent of the series. Skeletal traction was applied in 5.7 per cent, and occasionally it was necessary to wire spinous processes together in order to prevent recurrent dislocations.

The general mortality of the series was 25.8 per cent and was highest in the patients with lesions involving the fifth, sixth or both of these cervical vertebrae. Over one-third of the deaths (39.1 per cent) occurred within the first twenty-four hours, with the highest incidence among the patients showing complete paralysis. HOMER PHEASANT, M D

Bornebusch, K. Aseptic Necrosis of the Head of the Femur after Fracture of the Neck in Childhood and Its Relationship to Perthes' Disease (Die aseptische Caputnekrose nach Schenkelhalsfraktur bei Jugendlichen und ihre Beziehung zum Pertheschen Krankheitsbild). *Deutsche Ztschr f Chir*, 1940, 253: 458.

The not infrequent fracture of the neck of the femur in childhood often shows secondary aseptic necrosis of the head of this bone. In a particular case of lateral to medial fracture of the neck of the femur in a twelve-year-old boy with a satisfactory vertical fracture line of reduction, capital necrosis developed secondarily, it occurred with practically no clinical evidence, the first signs appearing after a long period of clinical treatment despite good consolidation of the fracture. A critical consideration of aseptic necrosis of the head after cervical fracture and osteochondritis coxae juvenilis (Perthes' disease) suggests that both lesions are identical and speaks for the development of Perthes' disease on a traumatic basis. Likewise, the vascular theory, that the disturbance of nutrition of the proximal end of the femur is at fault, permits after roentgenological studies, the supposition that the insufficient circulation also may be accepted as the cause of aseptic necrosis of the femoral head after fractures of the femoral neck in children. The fact that aseptic necrosis of the head of the femur following femoral-neck fracture presents a picture of the Perthes' type of lesion only during childhood suggests constitutional peculiarities of the proximal end of the femur in children. As prophylaxis against aseptic necrosis it is necessary for the patient to remain in bed a sufficiently long period and rest with complete elimination of function of the affected joint, later,

a non weight bearing caliper brace is prescribed
(Soviet G) JE OME C FIN R M D

Ottolenghi C. F. and Maulucci P. T. Fracture
D locations of the Tarsal Scaphoid Bone
(Fracturas tarsales distales del tarso) B I
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Traumatic lesions of the tarsal scaphoid are not very frequent. We must distinguish between isolated fractures of the body or tubercle of the scaphoid and fractures of the body of the scaphoid with luxation of the fragments. The former are simple to treat and offer a good prognosis; the latter are more difficult to treat and offer a bad prognosis. The present study is concerned only with the latter condition. The former is successfully treated by simple immobilization for about six weeks. The author then presents a detailed outline and classification of the traumatic lesions of the tarsal scaphoid: bone simple fracture, fracture with luxation, luxation fracture, fracture of the scaphoid tubercle, simple luxation, and total enucleation of scaphoid.

The causes of fractures of the tarsal scaphoid are listed as trauma to the dorsum of the foot tending to

flatten it, trauma to the posterior part of the leg or heel, torsion of the foot without falling, falling on the front of the foot, and direct trauma to the bone. In general, the lesions of the scaphoid are produced by extreme flattening or extreme flexion.

Fracture dislocations of the scaphoid offer a poor prognosis. The purpose of treatment is to reduce the luxation and maintain the position. To accomplish this, manual reduction, skeletal traction, partial or total resection of the scaphoid, and astragalo-scaphoid arthrodesis may be used. The various methods are discussed in detail, and numerous drawings and illustrations are included which clarify the text.

There is a detailed clinical report on 6 cases showing most of the discussed conditions. Roentgen ray illustrations are presented showing the condition at the onset and while under treatment.

In difficult cases, osteosynthesis by means of a spike or nail permits exact reposition of the fragments of bone. Arthrodesis may be necessary in certain cases to prevent a varus position. Resection of the scaphoid may be necessary in exceptional cases.

JACOB E. KLEIN, M.D.

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Homans, J. Exploration and Division of the Femoral and Iliac Veins in the Treatment of Thrombophlebitis of the Leg. *New England J Med*, 1941, 224 179

The author notes that exploration of the femoral and iliac veins has been found useful in treating some of the varieties of thrombophlebitis peculiar to the leg. Its principal indication is undoubtedly to prevent pulmonary embolism, but it may be called upon to correct peripheral vasospasm in the limb served by the diseased vein, to oppose recurrence of attacks of femoro-iliac thrombophlebitis, and, once the femoral vein has suffered destruction of its valves by earlier attacks, to prevent backflow down the vein. The most frequent indication in the opinion of the author is the "bland" type of thrombosis, especially the sort that originates in the deep veins below the knee.

The diagnosis of thrombophlebitis in the deep veins of the lower leg rests on the following findings:

The patient experiences lameness on walking, especially when going up or down stairs, such swelling and cyanosis as are present are confined entirely to the leg below the thigh, there is no generalized edema as in phlegmasia alba dolens, the dorsiflexion sign—discomfort behind the knee on forced dorsiflexion of the foot—is positive, swelling and cyanosis are always relieved by a few days' rest in bed, and in several cases, ineffectually treated, have recurred more than once.

The treatment consists of rest in bed, the foot being elevated from 10 to 15 cm. on a small, soft pillow. The swelling and cyanosis always disappear in a few days, but the dorsiflexion sign usually lasts for a week or more. At the end of ten days, all signs of disease having gone, the leg is actively used in bed, the foot being exercised first, then the knee and thigh, as in riding a bicycle. After four days of this treatment the leg is bandaged from toes to knee with semi-elastic cotton bandage and the patient begins to walk. If none of the original signs recur, he is allowed to resume a full active existence about three weeks from the time he went to bed. However, if the patient gets up and the discomfort, edema, and, especially, the dorsiflexion sign reappear, the superficial vein is at once exposed and divided. Operation is recommended when the patient has already undergone several episodes of bed rest and relapse.

Evidence has been produced to show that bland, non-obstructing thrombosis of the leg, whether occurring in active life or life in bed, and whether confined to the venous plexuses among the muscles below the knee or occupying as well the femoral and even iliac veins, is a frequent source of pulmonary embolism. This type of thrombosis, though difficult

of identification, can often be diagnosed, whether or not embolism has occurred, from a combination of clinical symptoms with discomfort behind the knee on forced dorsiflexion of the foot. Conservative treatment of this disorder is usually justified, but when embolism has occurred or when symptoms and signs have recurred at least once, exploration and division of the femoral vein are advisable.

Exploration and division of the femoral and iliac veins may also be indicated to cure peripheral vasospasm, especially when the vein has been the seat of previous thrombophlebitis, and to guard against the further recurrence of pulmonary embolism which has recurred once or more. For recurrent embolism, the author states that it seems best to operate immediately after the most recent episode, provided the same leg as before has clearly been affected, since at this moment exploration of the femoral region may demonstrate, more accurately than at any other time, the situation of the process. Exploration to relieve vasospasm is a field about which little is known. Any one of the three following types may be associated with a femoro-iliac thrombophlebitis: (1) the diffuse peripheral type, thought to occur principally in the venules just beyond the capillary bed, (2) a sudden constriction of the great artery accompanying the thrombosed vein, and (3) the late, diffuse peripheral spasm related to the early acute type, which may remain for years after an initial femoro-iliac thrombophlebitis has subsided.

Division of the superficial femoral vein in the presence of a bland, non-obstructing thrombosis below the knee is rapidly curative and leads to no swelling and cyanosis of the leg. Division of the common femoral and profunda veins for a bland, non-obstructive thrombosis that occupies the femoral vein itself causes considerable edema and cyanosis.

In concluding, the author states that division of the superficial femoral, common femoral, or even common iliac vein, following an old, canalized thrombophlebitis, causes little disturbance and may, because of the relief of the reflex vasospasm and the prevention of backflow in the vessel, be of benefit to the venous circulation.

HERBERT F. THURSTON, M.D.

BLOOD, TRANSFUSION

Mutti, P. The Immediate Action of Vitamin B₁ on Blood Crasis (Azione immediata della vitamina B₁ sulla crasi sanguigna). *Folia demograph gynec*, 1940, 37 431.

The author briefly reviews the mechanism of action and the clinical applications of Vitamin B₁ in various conditions affecting the nervous system, in the exchange of carbohydrates in cardiac activity, in the function of the gastro-intestinal tract, in preg-

nancy and in hyperthyroidism. He also reviews the possible mechanism of action of Vitamin B from the standpoint of a ferment or a hormone function. For example, he refers to the possible relationship between Vitamin B₁ and suprarenal cortex which certain investigators have indicated. He states also that there has been some evidence to suggest a relationship between Vitamin B and renal secretion and that Vitamin B favorably influences water exchange in the body. He cites these various examples as evidence for the existence of the close functional relationship among Vitamin B₁ hormones, ferments and enzymes.

The author then reviews the relation between vitamins and the blood. In this respect vitamins A, C and D are briefly considered as having some influence and the lack of these vitamins may result in slight anemia and leucopenia. The relationship of Vitamin B to hematopoietic activity is reviewed and considered in greater detail. In experimental pellagra a hyperchromic anemia is produced. In summarizing the experimental observations regarding the action of Vitamin B on the blood the author states that there is no characteristic influence on the leucocytes or platelets but that immediately following the administration of this vitamin there is an increase of red blood cells and hemoglobin. The efficacy of the Vitamin B complex in the cure of certain anemias is due to the tonic effect which it exercises on the gastrointestinal tract. After reviewing further the action of Vitamin B complex on the blood the author considered it desirable to determine experimentally whether the effect was due to the factor B.

His experiments were performed on 6 groups of rabbits some of which were normal and others gravid. Synthetic Vitamin B₁ (Roche) was administered intravenously in varying doses of 2, 5 and 10 mgm in the various groups. The blood studies consisted of the red blood cell count, platelet counts, reticulocyte and white blood cell count, hemoglobin determination (Sahl) and differential leucocyte count. These various blood studies were made at intervals of fifteen minutes, thirty minutes, one hour and two and six hours after the introduction of the Vitamin B. The results of these studies showed that following the introduction of Vitamin B there is a relative increase in red blood cell reticulocytes and hemoglobin and that this increase begins within fifteen minutes after the administration of the vitamins and reaches its maximum in about two hours, then it descends to normal and reaches the lowest level in about six hours. The increase in red blood cells is constant in character whereas this is not true for the reticulocytes and hemoglobin. The platelets, white blood cells and differential leucocyte count show little or no change. The results were similar in normal and in gravid animals. Following the experiment his similar results were obtained and on this basis the author states that the increase in red blood cells, reticulocytes and hemoglobin following the administration of Vitamin B₁ is

not influenced by the spleen. Vitamin B₁ was also found to have a slight hemolytic action.

In interpreting these results the author states that at first it occurred to him that one explanation was that they were produced by contraction of the spleen. However, the fact that similar results were obtained after removal of the spleen proved this explanation. Other hypotheses which the author suggests as a means of explaining the results obtained in his experiments are (1) Vitamin B has a diuretic action which has been generally recognized and which he observed in his animals also; (2) Vitamin B has a vasoconstrictor action on the cutaneous vessels and as a result of this irregular distribution of the blood elements might be produced; and (3) the vitamin may have some direct or indirect influence on the hematopoietic system. None of these hypotheses alone is satisfactory to explain this mechanism and the author concludes that probably all play some rôle.

MICHAEL D. BAKER, M.D.

Macht D. I. and Macht M. B. Phytotoxic Reactions of Some Blood Sera. *J. Lab. & Clin. Med.* 94: 26-597.

The authors reviewed previous works of one of the writers on phytotoxic studies of various blood sera. The method of study consisted in determining quantitatively the increment in length of the single well defined straight roots of seedlings of *Lupinus albus* after their growth for twenty-four hours in plant physiological (Shive) solution containing a small amount of the blood serum to be tested. The average increment in growth in 10 plants was compared with that of similar plants placed in the same physiological plant solution without the blood sera. The index of growth was then computed by dividing the increase in length of the test roots by that of the control plant roots.

One of these writers reported several years ago that menstrual blood sera as well as the saliva, milk, urine, tears and sweat of menstruating women had an inhibitory effect on the growth of *Lupinus albus* seedlings. Other states in which they found in the blood similar inhibitory effects on the growth of *Lupinus albus* seedlings were pernicious anemia, aplastic anemia, puffyphigus, leprosy, trachoma, Hodgkin's disease, severe secondary anemia, lymphatic leukemia, sprue, renal disease and advanced psychoses.

REXLEY W. RA. SO. M.D.

Crosbie A., Scarborough H. and Thompson J. C. Studies on Stored Blood. Observations on the Coagulability Mechanism in Stored Blood. *Fed. Proc.* 94: 48-4.

The authors studied the coagulability mechanism of stored citrated blood. Thrombocytes were found to disappear rapidly during the first seven days but little destruction occurred thereafter. The period for least fibrinogen was found to be the first increased coagulability of the stored blood was thought probably to be due to this rapid integration.

The fibrinogen content was found to remain normal for a period of fifty days. The prothrombin

level (Quick) was found to fall to about 60 per cent of normal in twenty days. The coagulation time (Howell) increased in the first three days and then gradually decreased.

From these findings the authors believe that blood stored up to ten days is not markedly inferior to fresh blood in respect to its coagulation mechanism and, after a first clinical test has been made, should be satisfactory in the treatment of many hemorrhagic disorders. THOMAS C DOUGLASS, M D

Black, D A K, and Smith, A F Blood and Plasma Transfusion in Alimentary Hemorrhage *Brit M J*, 1941, 1: 187

The infusion of serum or plasma has been shown to exert a favorable effect not only in experimental shock in animals, but also in shock from burns and wound shock in the human subject. It has been argued that even in acute hemorrhage the absolute deficiency of red cells is of less importance than the vascular and circulatory derangement which prevents the effective access of blood to the tissues, and that the improvement of circulation following plasma infusion would outweigh the reduction in the number of red cells per unit volume of blood. The authors state that the object of their article is to compare the effects of citrated whole blood with those of plasma in the treatment of patients with massive bleeding from the stomach or duodenum.

They present the case histories of 9 patients, all of whom were suffering from severe bleeding from the stomach or duodenum. The first 3 were treated with massive transfusions of citrated blood given by slow drip. The fourth patient was treated with reconstituted dried serum in four-fold strength. In Cases 5 and 6, plasma infusion was started but had to be supplemented by blood transfusion. In Cases 7, 8, and 9, it was possible to give plasma alone although Case 8 required the transfusion of whole blood five days later. The authors studied these cases and gave their hematological findings and the blood urea. They present their conclusions as follows:

In 9 patients with severe hemorrhage from the stomach or duodenum, plasma compared unfavorably with whole blood in its effects on the blood volume and hemoglobin concentration. It did not lower the degree of azotemia to the same extent as is shown by whole blood, and the general condition of the patients was adversely affected. It is suggested that the ill effects of plasma in these cases are due to forced dilution of the blood in excess of the limits favorable to recovery from hemorrhage. The circumstances which determine the usefulness of plasma in posthemorrhagic shock are discussed. In general terms, plasma is contraindicated when the hemoglobin is less than 50 per cent.

PAUL MERRELL, M D

SURGICAL TECHNIQUE

WAR SURGERY

Gorinévskaja V. Organization and Importance of the Surgical Auxiliary in the Army (Organisation und Umfang der chirurgische Hilfe im Armeebereich) Chirurg 1940 2/3 12

The author presents a description of the organization of surgical and in defensive and offensive operations under special conditions on the basis of his personal experience as a supervising and active army surgeon in a consultant capacity.

From the point of view of sanitary tactics two basic requirements are imperative: (1) that timing must dominate over distance factors and (2) that medicosurgical indications must be given precedence over merely evacuatory considerations. The war was fought in unusual local conditions—in a vast uncultivated uninhabited steppe under a burning sun with water shortage and lack of rail communications. Thanks to motorization of the army and of the medical apparatus transportation and supply were very satisfactory including the supply of preserved blood for blood transfusion. The conditions on the steppe were very favorable for motor transportation so that wounded men could be delivered to the field hospital 75 km from the front line within from ten to fifteen hours after injury.

A brief review of the surgical work accomplished in the different units and of the evacuatory facilities follows. The so-called battalion medical unit (BPM) did not really exist as such. It consisted of the battalion physician and his subordinate medical instructors and porters who dragged the wounded soldiers from the firing line on canvas. Carrying the wounded would be too difficult and dangerous. In the trenches and on the field of battle during offensive maneuvers by day and at night and under rifle and artillery fire and air attacks the wounded were located as quickly as possible and after the application of dressings and provisory splints were carried away as rapidly as possible. For this purpose ambulances were brought as close as possible sometimes to within 1½ or 2 km from the firing line. The wounded were promptly delivered to points designated where they could be properly cared for.

The next higher unit was the Regimental Medical Unit (PPM) situated in a movable tent from 3 to 6 km from the firing line. Here the wounded were classified and prepared for further transportation by means of transportation splints, injections and first aid. No operations were performed in this unit. Major surgical operations in the form of emergency interventions could be performed only in the next higher unit—the movable field hospital of the Divisional Medical Unit (DPM). This was from 5 to 10 km from the firing line but still within range of the artillery. During offensive maneuvers the distance was increased to 25 km.

The Divisional Medical Unit consisted of a series of tents—for classification of the patients with two adjoining tents, one for preparation and one for operation and tents accommodating from 25 to 30 stretchers for patients whose conditions were hopeless after operation. As a protection against air attack the tents were buried deep in the earth and covered with grass. In many cases urgent operations—laparotomies and trepanations—could be performed three or four hours after the injury. The tents were electrically lighted. However the flies and mosquitoes constituted a pest for which no radical cure was known. Bandages, laundry and operating gloves were always available in sufficient quantity. Much time was lost in preparing the patients for operation especially in hair cutting and shaving of the head in head injuries as the hair was usually matted with blood and smeared with sand. This soon dulled the hair cutting machines and razors which further hampered the work. It was suggested that the mobilized barbers be detached to the operating and dressing rooms and furthermore that the entire personnel be instructed in hair cutting and shaving. Most of the wounded men however were transported to the movable field hospitals (PPG) which constituted the chief center for surgical and operative treatment.

This was situated far about 75 km from the firing line and from 50 to 60 km from the DPM and had 200 cots fastened to earth elevations. The operating tent had 4 operating tables which were in constant use day and night. Top and lateral lighting were supplied by electric lamps with reflectors. Owing to the danger of attack from the air all the tents of the P were buried deep in the earth and camouflaged. The chief surgical work consisted in primary wound excision without suture immobilization of limbs in wounds of the bones and other injuries with the use of Kramer splints and Dettich transportation splints for the legs. Operations for injuries of the large body cavities and other important interventions. In these hospitals there were in addition to the competent surgeons other specialists (neurologists, roentgenologists, psychiatrists, anatomists, and anatomical pathologists) in order that necessary advice and special help was at hand at all times and could always be given. Plaster of Paris was not used as a rule except in test periods when it was possible to watch the patients for a few days. The wounded were evacuated after treatment by trucks and planes and those that could not be moved remained such as those with secondary shock, those operated upon in the large cavities of the body and those with complicated injuries of the extremities such as hemorrhage and gas gangrene infection.

The terminus of the Army Medical Organization is the Chief Evacuation Department (GOPF). Ideally such units should be situated near a

railroad, but under conditions like those on the steppe, it was located from 700 to 800 km to the next railroad station. In case of the more slightly wounded, this distance was covered in ambulances or ordinary trucks. The dangerously wounded were generally satisfactorily transported within two and one-half to three hours in planes, at first in ordinary Douglas planes, which later were reconstructed into convenient ambulance planes. Besides the dying, also the most serious cases were transported by plane.

The chief division of the Evacuation unit of the army was a large well equipped hospital, in which all the wounded from the front whether injured slightly or seriously, were concentrated. Most of the wounded were redressed and sent on by rail. Only patients with complications remained. In a series of such cases operation was imperative otherwise surgical treatment was not necessary.

So-called reinforcement groups were found valuable. They consisted of an experienced surgeon, a young junior assistant, 2 nurses (1 surgical and 1 anesthetic) and 1 or 2 orderlies, supplied with an operating table, the necessary instruments, and a tent for the operated patients. These movable reinforcement groups were called to duty and undertook a portion of the operations during major engagements in places where the wounded soldiers became congested.

The personnel gave best service when it was divided into certain permanent brigades with opportunity for resting and sleeping not less than six consecutive hours daily. The institution of twenty-four hour shifts of uninterrupted duty did not prove satisfactory. It is noteworthy that not a single case of tetanus developed.

(J. KORNMAHN) EDITH SCHANCHE MOORE

Cairns, H. Gunshot Wounds of the Head in 1940 *Roy Army Med Corps, Lond, 1941, 76 12*

Cairns has studied with careful detail 29 patients with gunshot wounds of the head, these casualties having arisen in the present war. He divides his cases into non-penetrating wounds (scalp wounds, and local fracture with intact dura mater), and penetrating wounds (depressed fracture with a dural tear, penetration of the brain by fragments of bone, penetration of the brain with fragments of bone and metal, and craniocerebral-orbital injury). He points out that frequently war wounds do not present the clinical syndrome of concussion with the symptom of loss of consciousness at the time of injury. In fact, 23 of his 29 cases did not show such a symptom, and he poses several interesting questions as to why this may be true. He also points out that there is frequently, after gunshot craniocerebral wounds, a fortunate tendency of such injuries to undergo spontaneous improvement, and even complete recovery of the patient may ensue. The author does not support the old theory that the foreign body must be removed to diminish the liability to epilepsy. He does believe that careful débridement, cleansing, and

clot removal are necessary, but decries unnecessary fishing about in the cerebral contents simply to remove a piece of metal. Modern warfare with its smaller, high-velocity missiles, chemotherapy, and other factors may have an important bearing on the fact that injuries in this war do not frequently result in infection and massive clot formation.

Special emphasis is placed on the necessity for thoughtful meticulous care of all head wounds. Wide shaving, excision of non-viable tissue, the gentlest manipulation of the cerebral tissue itself, thorough irrigation with warm saline solution, and suture of the galea and skin with interrupted silk sutures are each in themselves matters of the greatest importance. "From the point of view of conserving man power, the operation of cleaning and closing a scalp wound is much more important than the operation of removing a foreign body from the brain." Where operating conditions are bad, it is best to apply sterile dressings and move the patient back to a zone where careful attention may be given to the wound, since scalp wounds may be cleansed, excised, and sutured three days or more after injury if proper facilities are at hand. The author's final statement is significant: "The apparently trivial operation of cleaning and suturing a wound of the scalp is probably the most important neurosurgical operation of war."

JOHN MARTIN, M D

Hauenstein, K. Practical Experiences and Critical Considerations in the Treatment of Gunshot Wounds of the Jaw (*Praktische Beobachtungen und kritische Betrachtungen bei Behandlung Kieferschussverletzter*) *Deutsche Zahnärzt. Wchnschr.*, 1940, p 615

Gunshot wounds of the jaw are so diverse that treatment methods do not lend themselves to standardization, but must follow a different course from case to case, appropriate to the individual condition encountered. The experience gained from such individual cases is extremely instructive, and, therefore, Hauenstein reports a number that are especially outstanding, and presents instructive photographs and roentgenograms.

The first case was that of an injury to the left half of the face by a shell splinter. The most striking aspect of this case was the fact that all of the primary suturing of the soft parts had to be removed, while the wire splint which had been applied at the field hospital could be left in place. The sunken floor of the orbit was successfully elevated by Wassmund's method, a tamponade of the maxillary sinus. The double vision was corrected. Interrupted suture of the soft parts with drainage of the secretions through the oral cavity was done later. A separate cheek-plastic was not necessary.

The second case was similar to the first. Here again the sunken eyeball could be elevated by tamponade from below. Suture of the cheek following painstaking union of the separate muscular layers was complete except for a small salivary fistula. The locked jaw was gradually forced open and elevated

by gradually increasing the thickness of a block of gutta serena which was fixed to the lower gutter plate.

The third patient presented severe destruction of the bone and soft part of the lower jaw which was caused by a rifle bullet. The treatment by primary suture and flap plastic which was initiated in the field hospital and continued in a base hospital failed completely. The tongue was sunken backward and adherent to the floor of the mouth. Respiration was possible only in the sitting posture. The difficulty of splinting the lower jaw was finally overcome with a strong Schroeder bandage and a mandibular prosthesis. It was only then that attention could be turned to the face plastic. This was accomplished by means of flap formation from the region of the under jaw and broad pedicled flaps from the neck. The defect in the roof of the lips was corrected at a second operation. Later the end of the mandible was freshened and healing was obtained by means of splint fixation.

The sooner these splintered fractures are brought to the department of oral surgery (jaw hospital) the better will be the results, since it is only here that it is possible to undertake the frequently extremely complicated splinting procedures.

Sustaining therapeutic means are recommended such as heat light irradiation, pronator, trichlorol and cantan. (GERLACH) JOHN W. BRENNAN, M.D.

Hadfield, C. and Christie, R. V. A Case of Pulmonary Concussion (Blast) Due to High Explosive. *Br. J. St. J.* 1941, 7.

A case of hemorrhagic pulmonary concussion on a relatively new clinical entity which has developed and which has been studied only recently is described in detail with clinical course treatment and careful post mortem examination in the article. A soldier aged twenty three years was sleeping in a wooden hut on which a bomb fell and exploded. Symptoms of shock, dyspnea, cyanosis and pain in the chest and abdomen were present and examination disclosed scattered rales throughout the chest. The abdomen was tender and rigid. There was a slight elevation of temperature and pulse rate and the respiratory rate was 30 per minute. Sedatives and oxygen were administered. There appeared to be a gradual improvement in the condition. Roentgenograms of the chest showed a diffusely mottled shadow throughout the left lung and the middle zone on the right lung. The patient was transferred to another hospital and his condition gradually became worse with two encouraging remissions but he suddenly had a sinking spell and expired fifty one hours after his injury.

A post mortem examination was performed which disclosed no extensive signs of injury except a small superficial abrasion of the chest wall. The upper air passages contained a moderate amount of blood stained frothy fluid.

The pericardial fluid was slightly blood tinged. There were some petechial hemorrhages between

the parietal pleura and the thoracic wall. Both lungs were large. At least two-thirds of the left and half of the right lung were consolidated. All these lesions were shown to be continuous with large foci of deeply seated resolving hemorrhage. The central portions of the consolidation were dark venous blood clots but the indefinite edges were bright red.

Histological examination of the lungs demonstrated widespread intra-alveolar capillary hemorrhage. The outline and structure of the alveolar walls was preserved and were tightly packed with partly hemolyzed red blood cells.

The findings led the author to believe that this condition is caused by grossly dilated capillary vesicles. These appear to be a rather constant sign in cases of hemorrhagic pulmonary concussion due to detonation of high explosives in the vicinity of the injured. In the discussion of the case some suggestions as to treatment of people injured in this manner are given. J. E. TREMAYNE, M.D.

Thomas, C. P., Livingston, J. L., Barrett, N. R., Roberts, J. E. H. and Others. Discussion on Chest Injuries. *P. C. R. Y. Soc. Med. Lond.* 1941, 34, 63.

THOMAS stated that despite the low total incidence of chest wound there is an extremely high mortality rate and among those who die before there is any question of medical aid chest wounds rank high in the list. Chest wounds are a direct to all damaging effects of wound in other regions—shock, hemorrhage and sepsis. In addition there are other factors to which this high immediate and late mortality can be attributed.

These factors are dependent upon the interferences with the patient's cardiorespiratory reserve. The conditions producing this interference are:

1. The presence of either air or blood in the pleural cavity under sufficient pressure to enter and not only on the homolateral but also on the contralateral lung as a result of the ensuing mediastinal displacement at the same time the displacement produces severe cardiac disability, chiefly by inefficient filling of the ventricle of distortion of the superior and inferior vena cava.

2. The ill effects of open pneumothorax briefly stated are: (a) lung collapse on the affected side; (b) pendulum flail, that is the pendulous swinging of the injured respiratory surface from the expanded to the collapsed lung and vice versa; (c) mediastinal flutter, that is a foxtail swing of the mediastinum during inspiration with the stimulation of the contained cardiac and pulmonary plexuses; and (d) the loss of a proportion of the great veins which lead to deficient diastolic filling of the heart and in turn to a deficient cardiac output.

3. Cardiac tamponade results from fluid in the pericardial sac constricting the heart and preventing efficient diastolic filling. In these cases he found accumulated rapidly before the pericardium has time to stretch consequently a relatively small quantity of fluid is enough to produce a fatal outcome.

All these factors operate more seriously in the old than in the young. The young person's vital capacity has not been impaired by pulmonary disease or factors limiting efficient expansion of the thoracic cage, such as calcification of the costal cartilages or osteo-arthritis of the costovertebral articulations. Also, his cardiovascular system has not yet felt the strain of life.

The factors discussed, together with those common to all wounds, such as shock and hemorrhage, and the question of morbidity, both early and late, are the considerations when one is called upon to treat any of these cases.

In combating shock, it is established that the rapid replacement as early as possible of the circulating colloids will cut short the period of peripheral anoxemia, the factor leading to damage of the capillary bed.

Hemorrhage presents the same problem here as in other parts of the body, except that here, as in the abdomen, considerable blood loss may occur without evidence.

Patients who die during the first forty-eight hours, die as a direct result of the factors already mentioned. Those who survive this period only to succumb later do so as a result of sepsis, most commonly pleural or pulmonary, or a combination of both. Sepsis results from the presence of a retained foreign body, badly lacerated and dead tissue, and conditions which are favorable to the further growth of the infecting organisms. The pleural cavity with a hemothorax provides an ideal culture chamber for such a process, and our aim, when practicable, should be to remove not only the mud, but also the culture medium and the hemothorax, and to induce expansion of the lung as early a stage as it is possible to obliterate the pleural space. One other cause of late morbidity is the inefficiently treated hemothorax which, when left, organizes and forms a mass of fibrous tissue which may later become calcified, and thus prevents effective expansion of the lung. This disability becomes obvious only in later years when other factors lowering the vital capacity become operative.

Both anteroposterior and lateral x-ray films are necessary to localize opaque foreign bodies to reveal either a hemothorax or pneumothorax, as well as injuries to the bony cage. If possible, one anteroposterior film should be a penetrating one, as it is quite easy to miss a foreign body completely when it is overlaid by the heart and vertebral or diaphragmatic shadows, or by a hemothorax.

Experience has repeatedly shown that operation (when indicated, and the patient's condition will allow) should be done within the six-hour interval immediately following the infliction of the wound if the best results are to be obtained.

Definite indications for operative intervention during the six-hour interval, if the patient's condition will permit, are (1) wounds producing an open pneumothorax, more graphically called sucking wounds, (2) hemorrhage which is overt and progress-

ing, (3) hemothorax with a retained foreign body, (4) hemothorax where there is reason to suspect, from the direction of the injury, the position of the foreign body, or other radiological or clinical evidence, that the diaphragm, heart, or pericardium has been injured.

The cases which will not need operative intervention are (1) through-and-through wounds without hemothorax or hemoptysis, (2) through-and-through wounds in which the entry wounds do not constitute sucking wounds, even in the presence of a hemothorax.

Complete surgical revision of both entry and exit wounds is essential. It is well to note that there may be an entry and an apparent exit wound with the foreign body still inside of the chest, the exit wound having been made by rib fragments blown through the chest wall. The revision should be carried down to the pleura, and the fractured ribs should be resected to leave clean sound surfaces, all loose bony fragments being removed. The author has been constantly faced with cases in which excision has been done and this important part omitted. If one of the wounds is situated at a place convenient for thoracotomy, this should be enlarged and the chest entered at this site, but the temptation to explore through an ill-placed incision should be avoided at all costs. An intercostal incision is preferable, but there is no objection to entering through the bed of a resected rib, as the gap can be closed with pericostal sutures. In young patients with flexible chest walls, a simple intercostal incision is all that is necessary, as the space can be spread sufficiently with a good rib spreader. In older people it is wiser to resect a small segment of the rib above the space at its posterior end and, if necessary, doubly ligate and divide the intercostal vessels and nerve. A thoracotomy opening of from 6 to 7 in. long is usually ample, but there should be no hesitation in enlarging it if this proves to be insufficient. To prevent wound contamination the whole thickness of the wound should be covered with warm flavine packs which are efficiently kept in place by the double rib spreader. The chest is now emptied of blood and clots, preferably with a sucker which prevents trauma to the pleura, associated with swabbing. The lung, mediastinum, pericardium, diaphragm, and chest wall are then inspected.

The lung is the commonest site in which to find the retained body. It can usually be easily palpated, but in some cases in which there is also a large hematoma in the lung it may not be easy. The degree of lung laceration and the site of the foreign body are ascertained. With larger ragged foreign bodies the degree of laceration may be severe and, if so, it is probably wiser to resect the lobe if the patient's condition will permit. Simple removal of the foreign body in these cases inevitably leads to a prolonged period of chronic sepsis and illness. If the foreign body is situated in a fringe of the lung, wedge resection of the lung including the track of the foreign body gives the best results. In a large number of

cases however simple removal of the foreign body will be all that is possible

While removing foreign bodies close to the hilum great discretion should be used and unless the surgeon is prepared to face a lobar resection or difficult ligation they are best left alone. The presence of a lung hematoma does not call for resection but most certainly calls for removal of the foreign body. These cases even without a retained fragment may suppurate and they most certainly will if a fragment is retained. In certain cases the lung may be adherent to the chest wall at the site of injury. This type will come up for operative intervention only when the foreign body is large and there is a good deal of chest wall destruction. Adhesion of the lung will be suspected in the absence of a hemothorax or pneumothorax and in these cases the pulmonary condition will be dealt with during surgical revision of the wound which includes the removal not only of the foreign body but also of the bone fragments which are apt to be overlooked. The wound is then packed as it is in dealing with a lung abscess and not sewn up.

Unless the foreign body presents itself easily in the mediastinum it is best left alone. Foreign bodies in this wall rarely give trouble in later years.

Blood or a wound in the pericardium needs investigation. The pericardium should be opened in front of or behind the phrenic nerve or on the line of the opening the edges of which are closed. The sac is a patted clean and the heart chambers are examined. In the case of cardiac wounds a free flow of blood will continue after the sac is opened and this can be controlled by one of the various maneuvers while the wound is sutured. The pericardial wound should then be closed.

A wound of the diaphragm should be enlarged in a radial direction and the subdiaphragmatic area examined. In cases in which no clinical evidence of abdominal damage exists there is no need to make an extensive examination. When abdominal injury is strongly suspected a wider incision is indicated and it may be necessary to continue the thoracotomy incision through the costal margin or do a separate laparotomy. In all cases however small the incision the diaphragmatic deficiency must be closed as even from the smallest puncture a sizable diaphragmatic hernia may result later.

In cases in which the chest wound has not been caused by the foreign body itself but rather by the rib fragments the foreign body will often be found in another pocket in the chest wall and should be removed when accessible. No elaborate operative removal should be embarked upon however as if it has passed outside of the pleura it is probable that it will cause no further trouble. All the intrapleural manipulations being finished the pleural cavity is flushed with a warm weak acriflavine solution if no bronchial fistula is present and sucked dry and the chest wall is closed in layers with pericostal sutures to approximate the ribs. The practice of plugging wounds of the chest wall cannot be too strongly condemned. It

inevitably leads to sepsis and infection of the pleural cavity. If the pleura is closed and the wound sutured infection of the chest wall wound a few days later does not necessarily mean a pleural infection. If an intercostal trocar is not available a tube is introduced through an intercostal space.

The dressings are fixed with strapping which is carried just over the midline anteriorly and posteriorly. This maneuver not only supports the side which has been operated upon but also allows a free expansion of the sound hemithorax. On the patient's return to bed the intercostal catheter is attached to an empty bottle which provides water sealed drainage. In uncomplicated cases the intercostal tube should be removed in from forty eight to seventy two hours. The use of oxygen administered by means of a B L B mask is as important after as before the operation.

LIVINGSTONE stated that severe internal injury may be present without any external sign and the size of the entry wound is no guide in this respect. One should try to visualize the course of the missile when possible. Wound of the lower chest may be associated at the time or later with sudden onset of abdominal rigidity exactly simulating acute peritonitis and a laparotomy may be necessary.

Complications are frequent and may be easily overlooked. Close observation checked by roentgenograms from time to time is required. Local complications included collapse of the lung or lobe with or without infection, spontaneous pneumothorax, bronchial fistula, hemorrhage, infection of a previously sterile hemothorax, lung abscess and pneumonia, simple or infected effusions of the sound side and subphrenic abscess and pericarditis, infected or sympathetic. Typical pneumonia was not seen though cases of infection in collapsed lobes might be easily mistaken for this. General complications were acute dilatation of the stomach (6 cases), metastatic abscess in hip and brain, meningitis, thromboses, edema and nephritis.

BARRETT stated that there are two main groups of wounds. The first involve the superficial tissues and are straight forward because their effects are limited to the chest wall, the second include fractures of the ribs and open pneumothorax and are dangerous if the functions of the heart and lungs are disturbed.

Wounds of the muscles and superficial tissues are generally easy to handle. Large parts of the muscles of the pectoral girdle can be removed without loss of movement of the arm and infections respond well to treatment.

The most serious injuries are those which involve the muscles of the back and shoulder.

With fractures the mechanical stability of the thoracic cage is often so impaired that a special element of risk arises on this account.

In the case of simple fractures the surgeon is not concerned with the question of reduction or union, their importance lies rather in the fact that the movements of breathing may be limited by pain or rendered ineffective by an unstable chest wall.

To control the pain of fractures in the lower chest the skin should be shaved and strapping applied horizontally from points beyond the midline in front and behind. The object of this treatment is to prevent movement and, consequently, a wide area should be covered and the adhesive put on from below upward with the chest in full expiration.

The other indication for immobilizing a part of the chest is less well known, it is "paradoxical movement," a condition which occurs when a series of adjacent ribs have been fractured, or removed surgically, so that the chest wall is unsupported. In such cases the affected part does not move with the rest but is sucked in during inspiration and blown out during expiration, and this causes dyspnea and cyanosis because the cardiovascular system and the mechanics of respiration are disturbed. Treatment aims at padding and strapping the unstable part so that it no longer moves.

Another group of wounds, which are serious on account of their liability to disturb the cardiorespiratory systems, is that called "sucking wounds." These wounds are so grave that they color the whole picture of traumatic thoracic surgery, and it is generally true that the life of the patient hangs upon their treatment.

Sucking wounds should be closed because the condition of the patient is at once alleviated by any treatment which prevents air being sucked in and out. The reason for the improvement which occurs is not clear at first sight, since it is known that under certain conditions an open pneumothorax is not dangerous in man. A wide thoracotomy can, for instance, be performed in some patients under local or spinal anesthesia. Some men who were evacuated from Dunkirk without treatment were alive five or six days later in spite of an open wound of the pleura. The explanation of these apparent anomalies lies in the fact that in man during quiet respiration, an open pneumothorax does not embarrass the circulation or the respiration beyond the points of their reserve. If the burden of shock, painful respiration, hemorrhage, bronchial obstruction (by blood or secretions), or sepsis is added to an open pneumothorax, the result is immediately serious.

The best way to close an open pneumothorax in an emergency is to cover the wound with a pad, and it is convenient to carry a standard dressing for this purpose, it consists of a piece of mackintosh tissue to one side of which several layers of vaseline gauze have been sewn. This dressing should be strapped over the wound.

If the patient is seen soon afterward and resuscitation has been successful, the pad should be taken off, and the wound carefully and thoroughly excised and then closed by suture of muscle and perhaps skin. In every case an intercostal catheter should be inserted, because whenever the pleura has been opened by trauma it is liable to infection and also because a transient blood-stained effusion is common. Closed drainage with a water seal should be maintained for about forty-eight hours.

If the wound is large and cannot be closed by muscle or skin after excision it must be covered and rendered airtight with a large pad of vaseline gauze, and the pleural cavity drained as before. The prognosis is, of course, influenced by the size of the defect in the chest wall, but patients with large wounds sometimes get well, particularly if the lung has not been damaged and can be sewn to the surface at the margins of the gap. In such cases plastic operations on the chest wall will be necessary later on.

When infection is already established or probable, an open wound of the pleura must still be "closed," but the meaning of the word is now particular. The wound must be left surgically open so that pus and exudates can escape, but closed with an air-tight dressing.

ROBERTS said that a considerable number of cases of blast had now been studied. Some of the patients did not develop serious symptoms for forty-eight hours. The blast was in many cases a progressive lesion, capillary bleeding into the lung went on for several days. Professor Hadfield had made post-mortem examination in 38 cases of blast, in some of which death had taken place immediately, while in others there had been survival for several days. It was quite clear that the length of time after the blast injury before death occurred had a direct relation to the amount of hemorrhage in the lung. Some of the cases seen at the hospital showed punctiform hemorrhages in the skin of the abdomen and chest. If such a condition, which was not very easily seen, was observed, it might be assumed that the patient was suffering from blast until the contrary was proved. Some of the patients had severe abdominal symptoms with little to draw attention to the chest, and gross rigidity and tenderness of the abdominal wall, with no shifting dullness in the flank or absence of liver dullness. Roberts had knowledge of 2 of these cases, in which a laparotomy was performed without any lesion being found, and it was possible, although there was as yet no proof of it, that these symptoms were due to the hemorrhages into the muscles of the abdominal wall which were similar to those into the intercostal muscles. Less severe degrees of abdominal rigidity were common. Some of the post-mortem examinations had shown the intercostal muscles to be infiltrated with blood. Blast, therefore, should always be borne in mind in dealing with any group of bomb-wounded people. Roberts believes that no operations should be performed under a general anesthetic until it is shown whether the blast of the lung has been progressive. Blast had been overlooked in many cases because its presence was not suspected. The addition of a general anesthetic to the already existing lesion was not conducive to the recovery of the patient. JOHN J. MALONEY, M.D.

Nordentoft, J. M. Some Cases of Soldier's Fracture. *Acta radiol.*, 1940, 21: 615.

The author reports 4 cases of fractures, 2 of them in the distal end of the femur and the other 2 in the tibia. The patients were young men, who during

their military service developed bone lesions which by roentgen examination showed the onion peel characteristics and were suspected of being Ewing's sarcoma. The 4 patients ages were from nineteen to twenty four years. After a relatively short time in military service they developed pain and disability in the femur or tibia which followed strenuous military service to which the patients had not previously been accustomed. There was no preceding history of trauma.

Roentgen ray examinations of the involved bones showed that there was definite periosteal reaction with a very marked stratiform appearance which suggested the onion peel characteristics of an Ewing's sarcoma. No fracture lines were visible. The adjacent joint movements were within normal limits. There was no enlargement of the regional lymph nodes. The Wassermann examinations were negative. The microscopic examination of biopsy specimens showed the tissues to have the characteristic of callus. There was no evidence of sarcoma. This lesion resembled a similar condition which has been reported in the metatarsal, the tibia, the fibula, the neck of the femur and the pelvic bones.

These cases were found to be of no great importance. The sites of the periosteal thickening or fracture must be immobilized for a considerable period of time, the most satisfactory method being by means of a plaster of Paris cast. The point greatly stressed and to be remembered is that this type of insidious fracture occurring especially in soldiers has all the characteristics of Ewing's sarcoma. In some cases the diagnosis is so much in question that a biopsy is the only means of differentiation.

RICHARD J. BENNETT, JR., M.D.



Fig 1. Left Anterior view. Right Side view. Both show the onion peel periosteal reaction and the apparently intact compacta.

OPERATIVE SURGERY AND TECHNIQUE POSTOPERATIVE TREATMENT

Statistics. V. P. Roentgenoscopic Aspects of Postoperative Pulmonary Complications in Relation to Thoracic Genesis. *Est. 1946* 3

The article is based on observations of 100 postoperative pulmonary complications, 75 per cent of which occurred in men and 25 per cent in women. In an overwhelming majority of cases the changes in the lungs followed laparotomies. Thirty three per cent of all operations were performed under spinal anesthesia, an equal number under local anesthesia, 17.3 per cent under general anesthesia, 12.9 per cent under a combined local and general spinal anesthesia, and 0.54 per cent under intercostal anesthesia. Thirteen and four tenths per cent of the cases occurred during March, May and November, and 9.9 per cent in January and September, while only 2 per cent developed in August and 2.4 per cent in July. The author concludes that there is no definite relationship between the time of the year and the frequency of postoperative pulmonary complications. In 52.1 per cent of the cases the temperature ranged from 102.2 to 104 degrees F, in 36.8 per cent from 100.4 to 102 degrees F, and in 11.1 per cent from 98.6 to 100.7 degrees F. A dullness on percussion was present over the lower portion of one or both lungs in 90 per cent of the cases, cough occurred in 21.6 per cent, and pains in the chest in only 8.9 per cent. Sputum was raised in the early stages of the complication by 10.9 per cent of all the patients.

The clinical symptoms often did not correspond to the roentgenological and pathological anatomical findings. The most frequent type of postoperative pulmonary complication was a pneumopathy located in the lower portions of the lungs which produced variable physical findings not exactly identical to those caused by a lobar or bronchopneumonia. In spite of identical clinical symptoms, the pneumopathy furnished different findings: various cases viz (1) a normal picture of the lungs, (2) increased haziness on one or both sides, (3) a circumscribed focus in the region of the cardophrenic angle or some other place, (4) a homogeneous hazy appearance of the lungs adjoining the diaphragm, and (5) bronchopneumonic foci.

The discrepancy between physical and x-ray findings is due to the fact that the first are caused by a reaction of the pulmonary tissue, especially hyperemia which may or may not produce shadows in roentgenograms as this depends on the amount of exudate and absence of air. Signs of pneumopathy may already be absent when the patient dies and therefore the autopsy may fail to disclose it while other causes in the same condition may be transformed into a lobar or bronchopneumonia. Hence the post mortem finding may not correspond to the clinical symptoms.

Less frequent postoperative pulmonary complications are aspiration pneumonia, atelectasis, pneumonia of an embolic origin, obstructive emphysema.

combined with atelectasis, and caseous pneumonia developing on the basis of a pneumopathy

JOSEPH K. NARAT, M.D.

Kekwick, A., Marriott, H. L., Maycock, W. d'A., and Whitby, L. E. H. *Diagnosis and Treatment of Secondary Shock, A Study of 24 Cases—Primary and Secondary Shock—Assessment of Severity—Treatment and Assessment of Recovery—Hematological Aspect* *Lancet*, 1941, 240 99

The summaries of 24 cases of injury from air raids with shock are presented. Whitby and his associates believe that had it not been for the promptness with which the patients were treated, most of them would have died. In the presence of these severe injuries the onset of symptoms of shock appears to be rapid, and the cardinal sign of the condition, a sustained and serious lowering of the blood pressure, is well established within a few hours. Primary shock due to psychogenic and neurogenic influences is common among air-raid casualties which reach the hospital soon after injury, and lowered blood pressure, sweating, pallor, and thirst may be noted. Differentiation from secondary shock is wisely made by allowing a period of observation, during which rest in the recumbent position is combined with warmth and morphia, unless the nature of the wounds makes it obvious that the patient must have suffered the reduction in blood volume which is the cause of the lowered blood pressure. Blood pressure should be taken every fifteen minutes and if at the end of an hour it is still below 100 mm Hg, some degree of secondary shock is probably present and transfusion should be done without delay. The 24 cases presented emphasize that in the earlier phases a blood-pressure reading is the only reliable measurable observation and that the pulse rate does not always rise as the blood pressure falls. Therefore, the pulse rate is unreliable. The mental state, pain, color changes, sweating, and general body temperature bear no quantitative relationship to the degree of severity of shock.

Since the symptoms of secondary shock are caused largely by the gross reduction in the blood volume, the obvious treatment is to restore the blood volume. Information is required as to the best fluid to use for the purpose, when to transfuse, in what amount, and at what rate. Transfusion of blood or plasma should be carried out without delay on those with serious wounds and dangerously low blood pressure, on those whose pressure does not return to 100 mm Hg within an hour of routine resuscitation, and on those whose blood pressure, observed at fifteen-minute intervals, continues to decline during the resuscitation hour. A rise from 10 to 20 mm Hg is obtained after each 540 c cm that are transfused, and in order to obtain a systolic pressure of 100 mm Hg or over, it is necessary to transfuse not less than 50 per cent of the calculated blood loss, which may amount to from 1,000 to 3,500 c cm in severe cases of secondary shock. If this rise does not occur, or is

not maintained, continued bleeding should be suspected. The amount to be transfused should be governed by the blood pressure response. Serial hemoglobin or hematocrit determinations to permit the calculation of blood volume are accurate indices, except in the presence of continued bleeding, when they cause under-estimation of the blood loss in proportion to the amount of bleeding. As to rate, the first two 540 c cm bottles should be administered rapidly, each bottle occupying about fifteen minutes. If this produces the anticipated rise in blood pressure, the rate for administering more can be judiciously slowed.

Plasma and blood are equally effective for restoring the blood volume. The plasma used was from ten to fifty-six days old. While chills were observed with the administration of plasma in 3 cases, investigation of these cases showed that in none could the chills be attributed to old plasma, opalescent plasma, plasma with clots, or refiltered plasma. When the amount of fluid needed reaches three 540 c cm bottles or more, at least one bottle in three should be blood. It is not likely that sufficient citrate to cause a dangerous alkalosis could be given in the form of stored blood or plasma.

An approximately quantitative replacement of lost fluid is required. At least half of this should be protein fluid, otherwise the restoration of blood pressure will be temporary and an operation will not be well borne. Transfusion should continue during any delay before operation as well as during operation, especially if more blood is apt to be lost at that time.

EDWIN J. PULASKI, M.D.

ANTISEPTIC SURGERY, TREATMENT OF WOUNDS AND INFECTIONS

Agostinelli, E. *The Treatment of Compound Fracture* (Contributo alla terapia delle fratture esposte) *Polichin*, Rome, 1940, 47 sez. prat. 1742

The question of primary closure of compound fracture after debridement from time to time arouses discussion. The author reviews the literature and states that Fabiani in 1884 was the first to practice this method. He notes that Fontaine (1934) had recoveries in 82.62 per cent of 127 cases. Arnaud (1931) asserts that with primary closure the mortality is greater than with conservative treatment (disinfection and immobilization). Furthermore, Baldwin and Gilmore reported 7 cases of gas gangrene due to deficient sterilization of the wound in primary closure of compound fracture. Maghulo maintained in 1936 that primary closure was the ideal treatment of compound fracture but that delayed primary suture was safer. The author prefers careful debridement of the wound followed by thorough disinfection, reduction of the fracture, and application of a plaster cast with a window for daily dressings of the wound. More recently the author has used cod-liver-oil gauze dressings on alternate days in taking care of the wound. The invasion of pyogenic organisms is prevented in this way and epithelization oc-

curs more rapidly. The use of olive oil instead of cod liver oil has not given the author the same results.

The author briefly reports a series of 6 cases of compound fracture treated in the manner with very favorable results. However the author admits that in a larger series the statistics of recovery would not be so favorable. He calls attention to the 1938 statistics of Klager who in a series of 302 such cases had a total mortality of 6 per cent and was forced to perform amputations in 16 per cent of the cases.

JACOB E. KLEIN, M.D.

Nostschinski, V. R. Subpectoral Phlegmon
Vol 44 1940 60 18

Acute suppurative processes developing in lymph nodes of the subpectoral region cause a moderate general reaction in the majority of cases and subside under conservative treatment or following superficial incisions. In a smaller number of cases the local and general symptoms are more pronounced while in a limited number of instances an acute febrile condition with hardly noticeable local symptoms dominates the clinical picture. Deeply located subpectoral phlegmons belonging to the last mentioned group may be confused with influenza, pneumonia, typhoid fever and acute articular rheumatism.

The diagnostic difficulties may be responsible for a delayed exposure of the infectious focus. Such a delay may create great technical difficulties in performance of the proper operation and threaten a loss of life. If an acute septic process with an obscure location of the primary focus is present, one should think of a subpectoral phlegmon. One of the earliest signs is a painful contraction of the pectoralis major muscle comparable with the rigidity of the abdominal wall in the presence of pathological processes within the peritoneal cavity. The spastic contraction of the muscle is responsible for a limitation of motion of the shoulder. An ascending infection starting in superficial layers of the distal portion of the upper extremity is the main etiological factor. Therefore in doubtful cases the attention of the surgeon should be focused on minor injuries of the fingers, wrists or forearms.

The most frequent micro-organisms found in such conditions are staphylococci but in grave cases hemolytic streptococci have been demonstrated. The infection spreads through the lymph vessels and reaches the *angulus venosus*. This mode of dissemination of bacteria is responsible for prolonged septic symptoms. In addition to dull pains and indefinite swelling in the pectoral region supplemented by an adduction contracture of the shoulder the author noticed in many cases also the presence of two painful circumscribed areas, one immediately below the clavicle, 1 cm. median to the anterior axillary line and a second at the level of the second intercostal space slightly lateral to the medioclavicular line.

An early and deep incision is the method of choice in the treatment of deep subpectoral phlegmons.

The incision is carried parallel to the external border of the pectoralis major muscle. Pus may be found immediately beneath the pectoralis major muscle beneath the pectoralis minor muscle or in both locations.

JOSEPH K. NARAT, M.D.

Nikono, O. N. Subpectoral Phlegmons
Vol 44 1940 60 3

In the course of ten years the author treated 149 patients with suppurative conditions among them were 596 cases of phlegmon in 43 of which the phlegmon was located in the subpectoral region. Twenty-one of the patients were men and 14 were women. The phlegmon was found on the right side in 23 cases and on the left side in 20. The most frequent pathogenic micro-organisms found were streptococci and staphylococci. In chronic cases tubercle bacilli were usually present and the process originated in the ribs. The predisposing factors are direct trauma or an overextension of the pectoral muscles with resulting minute hemorrhages. Acute infectious diseases may also lower the resistance of the patient and thus contribute to the development of a phlegmon. The port of entry may usually be found in superficial injuries in the shoulder region or in the upper extremities. At the time when the phlegmon is found the original wound may be healed. Lymphangitis or lymphadenitis of the nodes in the elbow region is found only in exceptional cases. In the presence of general malaise, chills, high temperature and pains in the shoulder, one should think of an infection of deeply located regional lymph glands. The infection is carried from the upper extremities to the subpectoral region through superficial as well as deep lymph paths.

In view of the gravity of the condition which is followed by a relatively high mortality, the patients should be hospitalized. The best therapeutic measure is an early incision carried along the outer border of the pectoralis major muscle.

The differential diagnosis should consider influenza, typhoid fever, acute pleurisy and pneumonia. Pains in the chest, dyspnea, cough and bronchitis may suggest the two last mentioned conditions while nausea, vomiting and disturbed intestinal functions may point to the diagnosis of typhoid fever.

JOSEPH K. NARAT, M.D.

Hirell, W. E. and Brown, A. E. The Treatment of Septicemia. Results of the Administration of Sulfamido Compound
J Am M 42
194 6 79

Enough time has elapsed since the introduction of sulfamido compounds the authors wrote to justify a study of the merits of these compounds in the treatment of septicemia. After a discussion of certain cases they had left for study 155 cases of septicemia caused variously by a hemolytic streptococcus, streptococcus, staphylococcus aureus, pneumococcus, pneumomoniasis and escherichia coli. Of these 155 cases they selected the 103 in which sulfamido drugs had been employed and they compared the results with these

SURGICAL TECHNIQUE

cases, not only with those in the 52 cases in which these drugs had not been employed, but also with the results in 119 similar cases encountered in the period from 1934 to 1936, inclusive, when sulfamido drugs were not available.

It is conservative, the authors thought, to estimate that use of these drugs in cases of septicemia has almost doubled the recovery rates, in general, but this does not mean that results in the presence of different organisms are uniform. In any series of cases of septicemia, by far the larger proportion is caused by the hemolytic streptococcus and the staphylococcus aureus. Fortunately these are the two microorganisms against which, in the authors' experience, sulfamido drugs have proved most effective.

Prior to the advent of sulfamido therapy, 3 factors were of great prognostic significance in septicemia. These were age of the patient, colony count on initial blood culture, and maximal leucocyte count. These factors, they found, were of reduced significance when sulfamido drugs were used. Evidence to support this statement from the authors' series of cases is that (1) among patients more than fifty years of age the recovery rate was increased sixfold, (2) approximately as many patients recovered, whether the initial colony count was low or high, and (3) the recovery rate was not substantially affected, whether the maximal leucocyte count was below or above 10,000 per cubic millimeter of blood.

The experience of a series of patients who had that in the treatment of a series of patients who had septicemia caused variously by the 5 microorganisms named in a previous paragraph, the single factor of greatest importance was adequacy of treatment. Evidence of this is that when adequately treated with sulfamido compounds, patients had a seven-out-of-ten chance of recovery as against a seven-out-of-ten chance of dying if inadequately treated. In the latter group results were no better than if sulfamido drugs had been completely withheld.

Apharyanz, P. S. Methods of Therapy of Gas Gangrene as Used in the Surgical Department of the Twelfth Clinical Hospital. *Nov khir arkh*, 1940, 46: 319.

Of 2,370 patients with infected wounds following trauma, 34 presented gas gangrene, 24 of these were men and 10 were women. In 21 cases the lower extremity, in 9 the upper, and in 4 other parts of the body were affected. Fourteen patients were admitted not earlier than the fourth day of the disease. The mortality was 50 per cent.

Easily accessible foreign bodies should be removed from contaminated wounds, shock should be combated, and compresses saturated with hydrogen peroxide, chloramine, or potassium-permanganate solution should be applied if the patient cannot be hospitalized immediately. In addition, the involved extremity should be immobilized. As soon as possible after hospitalization, debridement should be undertaken or, if possible, the whole wound excised.

After that, the compresses already mentioned should be applied.

The author also recommends blood transfusions, and an early parenteral administration of large doses of specific serum, supplemented by local applications of the same serum.

Finally, the author employs daily intravenous injections of 1.5 to 2 c cm of a 0.5 potassium-permanganate solution, as suggested by Voron, because the latter was able to show in experiments that this solution counteracts shock and increases the oxygen tension in the blood.

JOSEPH K. NARAT, M.D.

Hamburger, M., and Rueggsegger, J. M. Treatment of Staphylococcal Septicemia with Sulfamethythiazole and Sulfathiazole, a Report of 12 Cases. *Ann Int Med*, 1941, 14: 1137.

The authors report their experience in the Cincinnati General Hospital with 27 cases of staphylococcal septicemia during the period from 1933 to 1939, and add 12 cases treated during the past year with thiazole derivatives of sulfanilamide. Most of the patients had at least two positive blood cultures. Among the earlier group there were 7 cases of osteomyelitis, with a mortality of 57.1 per cent and among the remaining 20 the infections were of other clinical varieties, with a mortality of 95 per cent. Six patients treated with sulfanilamide, 3 with sulpyridine, 2 with bacteriophage, and 5 with polyvalent staphylococcus serum are included among these fatalities.

The 4 deaths which occurred among the 12 cases treated with thiazole derivatives were all in patients who developed acute bacterial endocarditis, a complication which apparently resists all forms of treatment. It is pointed out that if these cases are disregarded, the small series represents 8 consecutive cases in which clearing of the blood stream took place after the invasion by staphylococci. There was no evidence that the drugs had any effect upon local lesions, which were treated surgically whenever accessible.

Detailed clinical reports on the 12 cases treated with thiazole are included. The authors conclude that the evidence is sufficient to warrant a careful clinical study of the effectiveness of sulfathiazole in staphylococcal septicemia.

JOHN S. LOCKWOOD, M.D.

Schneider, L. The Local Use of Sulfanilamide Powder and Hydrogen Peroxide in Wound Infections. *Am J W Sc*, 1941, 201: 208.

Schneider presents 2 cases of wound infection due to a combination of the hemolytic staphylococcus aureus and hemolytic streptococcus which were effectively treated by the implantation of sulfanilamide powder and hydrogen peroxide. The first case was the sixth admission in two years of a chronic perostitis of the right femur. Over a period of ten weeks, various forms of treatment were not successful. Metastatic sinuses developed about the heel and ankle. In addition to the organisms previously

mentioned the bacillus pyocyaneus was cultured from the thigh and ankle. Two grams of sulfanilamide suspended in 30 c.c. of hydrogen peroxide were introduced into the sinuses and the wounds were covered with many gauze dressings. In twenty-four hours the discharge was less and the granulation appeared healthy for the first time. After four successive days of treatment only the bacillus pyocyaneus was cultured. When the same treatment was applied to the ankle wound it also improved. Once a week powdered sulfanilamide was sprayed on the wound by means of a Shelanski insufflator. The wound gradually closed and after three and one-half months of sulfanilamide therapy (570 gr. locally) complete healing of the wound and of the osteoperiostitis had taken place. Cultures remained consistently negative for all organisms except the bacillus pyocyaneus until the wound had completely healed.

The second case was a deep draining abscess of the right thigh with no demonstrable bone lesion. The abscess was opened and packed with 6 gm. of sulfanilamide powder and some hydrogen peroxide. The next day 4 gm. of sulfanilamide were used. In three days there was complete cessation of the discharge. Cultures revealed only the staphylococcus aureus, the hemolytic streptococcus having disappeared but when repeated two days later no growth

was obtained. Twelve days after operation the wound was healing by primary union. A total of 10 gm. of sulfanilamide were used.

The basis for the use of hydrogen peroxide with sulfanilamide locally is the oxidizing action of the latter, the mode of action of sulfanilamide. The hemolytic streptococcus, pneumococcus, gonococcus, meningococcus, and bacillus coli all produce hydrogen peroxide. Sulfanilamide has an anti-catalase activity which prevents the destruction of hydrogen peroxide produced by the organisms and allows a high enough concentration of the peroxide to be reached to be toxic to the organisms. Staphylococcal lesions usually being of a reducing nature do not allow for the oxidation of sulfanilamide to products that exhibit anti-enzymatic activity. It was believed that the addition of hydrogen peroxide helped to overcome the reducing properties present in the wound.

Schneider warns about the high blood sulfanilamide levels produced by this mode of administration and states that all the toxic manifestations produced by oral administration must be watched for. In the first case the patient developed a transient alopecia and a papulovesicular eruption of the palms and soles which was one month in disappearing after cessation of the drug. EDWIN J. PCLASK, M.D.

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Holmes, G W The Development of the Science of Roentgen Technique *Am J Roentgenol*, 1941, 45 161

America's foremost radiologist here reviews some of the achievements which have led to the development of this specialty. One of the early observations which Elihu Thomson made in 1896 was based on experiments on himself which demonstrated the injurious effect of the roentgen rays. Thomson consequently warned users of roentgen equipment of the dangers of this type of light. Unfortunately, the failure to appreciate fully these observations led to much suffering which might have been avoided.

The introduction of the mechanical rectifier by Snook was a revolutionary change and made available an amount of energy which far exceeded the capacity of the early roentgen tube. It was not until Coolidge developed the hot-cathode tube that the power thus made available could be used to the fullest extent. Further development of the cathode tube by Coolidge and the perfection of the rotating anode tube first described by Rollins and others several years ago make possible the production of films which demonstrate in sharp detail the fine structures of moving objects.

The most important development in the field of roentgen films was the introduction by the Eastman Company of double-coated films which increased the contrast in the negative and permitted the use of the double-intensifying screen. The use of the intensifying screen had been first recommended by Pupin in 1896.

The introduction by Bucky of Germany of a grid which, when placed between the film and the patient, eliminated much scattered radiation, led to better detail and contrast in films, but the perfection of a movable grid by Hollis Potter in 1916 led to its greater use.

Many important technical procedures have resulted from a more thorough knowledge of physics, anatomy, and pathology. Holmes cites as examples of this type of contribution the positions for examination of the maxillary sinuses, mastoid processes, and petrous tips developed by Caldwell, Waters, Grant, and Law.

The importance of stereoscopic roentgenograms was recognized before 1900 and Caldwell described apparatus for the production of a stereoscopic image on the fluoroscopic screen in 1901. The author believes that stereoscopic film examination should not be used to supplant views taken in anteroposterior and lateral planes. He calls attention to the fact that lateral films of the shoulder, spine, hip joint, and chest are of great importance.

Holmes reviews in some detail the work of Francis Williams who developed an unusually satisfactory

fluoroscopic technique and made a number of observations between the years 1895 and 1901 which are still of value. Among these are the importance of fluoroscopy in the detection of motion of movable organs, its convenience as a means of preliminary examination to determine the most advantageous points of view for taking roentgenograms, and its value in the determination of the excursion of the diaphragm in the localization of early tuberculous lesions. Williams was probably the first to describe the roentgen appearance of the so-called "beriberi heart."

The use of contrast substances in roentgen examination was initiated by Becher of Berlin who, in 1896, injected lead subacetate into the gastrointestinal tract of guinea pigs which had just been killed. In the same year Cannon began studies of the gastro-intestinal tract of living animals, using capsules of bismuth subnitrate. Two years later he and Williams studied the gastro-intestinal tract of children, using bismuth subnitrate mixed with food. Although the injection of air as a contrast medium was tried before 1900 its full importance was not realized until Dandy used it in a study of the cerebral ventricles and the subarachnoid spaces of the brain and cord. The development of iodized oils by Forestier and Sicard constituted another outstanding advance and permitted the study of the bronchial tree. Other contrast substances which, when taken into the body, are excreted by special organs have added new information and the author believes that this field is incompletely explored.

Holmes believes that it is the duty of the older roentgenologists to interest outstanding young men in the field in order that a healthy growth of the science of radiology be maintained. He believes that the older radiologists should make certain that roentgenography is accorded the place in universities, hospitals, and in the medical world which it deserves. He outlines some of the roads along which progress may be made. HAROLD C OCHSNER, M D

Pendergrass, E P, and Young, B R The Roentgen Diagnosis of Neoplasms of the Air and Food Passages, with Particular Reference to the Larynx *Radiology*, 1941, 36 197

This article constitutes an excellent review of the anatomy and physiology of the air and food passages. Neoplasms of the tongue do not usually require roentgenographic examination for their discovery. The symptoms of such lesions are briefly outlined. The symptoms of the oral pharynx produce blurring of the pharyngeal air shadow and thickening of the posterior pharyngeal structures which, if the growth is malignant and of short duration, is likely to be more marked on one side than on the other. Growths in the laryngeal pharynx, if unilateral, cause the outline of the pyriform recess to be indefinite. This

structure may become quite shallow or even obliterated. Such lesions are often seen best in postero-anterior roentgenograms.

Carcinoma of the larynx may produce enlargement or change in contour of the soft tissues of the extrinsic larynx. If the tumor arises in the ventricular bands it encroaches upon the ventricles. Failure of visualization of the laryngeal ventricles in the lateral view indicates some abnormality unless excessive ossification in the thyroid cartilage is the causative factor. Small benign tumors of the vocal cords such as papillomas and fibromas are visualized in both lateral and sagittal roentgenograms. Carcinoma involving the vocal cords which extends into the subglottic region is best demonstrated by a body section roentgenogram. HAROLD C. OCHSNER, M.D.

Isola A. Recent Progress in Arteriography. Serieraphy and Photoradiography. (Nuovi progressi nella teriografia. L'angiografia fotograforadiografica). *Radiologia* 1941; 5: 8.

In a good arteriogram it is necessary to show not only the main trunk and the chief branches of the artery but also the finest and most distal ramifications. This cannot be done with the usual roentgen film 30 by 40 cm. for with this film only a limited segment of the artery can be shown. The author has devised a serieraphy by means of which it is possible to get a more prolonged view of the course of the opaque fluid through the artery. He takes 4 poses 15 by 40 cm. at varying intervals of time. By varying the interval properly he has even been able to obtain images of both arteries and veins with a single injection of opaque substance. Two diagrams of the

apparatus and arteriograms of 3 cases are shown. However, even this apparatus does not make the whole of the artery visible for the length of the arteriogram is only 40 cm. while the limb is longer than that (Fig. 1).

He has also tried to apply fluoroscopy to arteriography. In this way using two fluorescent screens placed end to end on which the limb is laid and a series of roentgenograms made he has obtained a complete picture of the course of the contrast substance through the artery. However in spite of some technical devices of which he made use the results were not entirely satisfactory because the images were not very clear. There was a great deal of granulation and consequently a lack of detail. He thinks this method cannot be used in arteriography until it is perfected further.

AUDREY G. MORGAN, M.D.

RADIUM

Mayneord W.V. and Honeyburne J. A Physical Study of Intracavitary Radium Therapy. *Am. J. Roentgenol.* 1941; 45: 335.

In dealing with the physical dosage of intracavitary radium expressed in roentgen units the authors warn against oversimplification such as for example the statement that the dose to the cervix was so many roentgens. It was found that a change of position of only 0.1 cm. of a radium needle or tube may result in a difference of 100 per cent in the dosage at a particular point. Furthermore it must be realized that points only a few millimeters apart may vary in dose very considerably. Therefore the



Fig

PHYSICO-CHEMICAL METHODS IN SURGERY

doses calculated close to radium containers represent gross approximations at the best. In practice, greater benefit is derived from the use of graphical methods of interpretation from isodose curves and the establishment of individual diagrams showing the complete distribution as well as the magnitude of the dose in roentgens at certain selected points. The description of the radium source and the statement of the time of treatment, in milligram hours or destroyed millicuries, must also accompany such a specification of the dosage.

In previous work isodose curves were determined by the authors for point sources of radium filtered with uniform spherical shells. However, since in clinical application, radium is always used in the form of tubes or needles, allowance must be made for the increased filtration at large angles to the normal as rays pass through filters at glancing emergence.

In the present article, this type of source is investigated by three methods: (1) the protractor, (2) the integral table, and (3) the dose contour method. The first and third are employed for the first time and therefore described in greater detail. In particular, a study of type of dose contours around linear sources is made and complete distributions are calculated around a representative series of radium applicators.

By this procedure, it is possible to construct a standard set of distribution diagrams not only in one but several planes, a fact which is of great clinical importance. After consultations with Hurdon of the Marie Curie Hospital, the authors constructed such standard diagrams for the technique of radium application used successfully at that institution for a number of years for the treatment of cancer of the cervix and of the body of the uterus. The most common arrangements for the carcinoma of the cervix were (a) two 25 mgm intra-uterine radium tubes in tandem with 2.5 cm of active length, each with 1.0 mm of platinum filtration, and three flat, intra-vaginal silver boxes (one against the cervix and one into each lateral fornix), each box containing 4 parallel 5 mgm radium needles with 1.3 mm of platinum equivalent filtration, and (b) one single 30 mgm intra-uterine tube and one large intravaginal platinum box. For carcinoma of the body of the uterus, the arrangement (c) was the same as arrangement (a) for carcinoma of the cervix except that two additional 8 mgm tubes were placed into the cornua, one of 1.1 cm length on each side with a total filtration of 1.0 mm of platinum, and only two intra-vaginal boxes were used, unless the cervix was also involved.

The distribution of radiation in space around one single tube was easily obtained by rotating the diagram about the axis of the tube. However, if the irradiation from several radium sources overlapped, the construction of spacial distribution diagrams became quite complicated. To simplify matters, the authors used the "three-dimensional dose-tinder" which permits the dose received from each of

a number of sources at a given point to be read simultaneously. This instrument is also described in detail in the text and illustrated. Likewise, a number of resulting diagrams in three mutually perpendicular planes are reproduced. From such planes it was easy to construct the isodose surfaces of particular interest. It was even possible to build isodose models by cutting out in cardboard the shapes, for example, of 100 roentgen hour contours, slotting them together in their perpendicular positions and filling up the framework so obtained with paraffin.

The establishment of complete volume distribution and isodose contour diagrams for intracavitary radium therapy permits comparison of various technical procedures leading to certain standard clinical arrangements of the radium sources.

T. LEUCUTIA, M.D.

Hurdon, E. Radium Treatment of Cancer of the Uterus. *Am J Roentgenol*, 1941, 45: 250

This article, to a certain extent, is a continuation of the former. It gives clinical consideration to the volume distribution and the isodose contours of the radiations in relation to critical points in the pelvis when the radium sources are distributed according to the technique described by Mayneord and Honeyburne and used at the Marie Curie Hospital for the treatment of carcinoma of the cervix and corpus uteri. Up to 1932, intracavitary radium was employed without supplementary external irradiations, and this article deals only with that phase of the work.

Carcinoma of the cervix uteri. Generally speaking, the radium therapy of the carcinoma of the cervix uteri is based on the principles of moderately intensive interrupted dosage with a wide distribution of the radium sources, so as to obtain the most effective dose possible in distant tumor areas. If, for example, arrangement (a) as described in the former article, is used, the total dosage is given in sixty-six hours, divided into three treatments of twenty-two hours each, given at intervals of one and two weeks. The total radium application varies from 6,000 to 8,000 roentgens on the tissues of the cancer region. The following doses reach the various critical regions:

- | | | | |
|--------------------------------|---|---|-------|
| Lateral pelvic regions | | | |
| A | 2 cm from the cervical canal at the level of the internal os | Total dosage 6,600 roentgens | Total |
| B | 4 cm from the canal at the same level | Total dosage from 3,300 to 4,500 ¹ roentgens | Total |
| C | 5 cm from the canal at the same level | Total dosage from 2,300 to 3,800 ¹ roentgens | Total |
| D | At 1 cm above the external os, 5 cm from the canal | Total dosage from 2,640 to 5,000 ¹ roentgens | Total |
| Anterior and posterior regions | | | |
| | Total dosage at 1.5 cm from the cervix anteriorly is 3,760 roentgens and posteriorly 3,300 roentgens. Careful packing insures this distance in most cases so that the bladder and rectum are well | | |

¹Lateral applicators packed well up and out.

protected although it is advisable to keep both organs empty as much as possible while the radium is *in situ*.

The results at the end of five years are shown in Table I. The stages conform to the classification of the League of Nations Commission.

TABLE I—CANCER OF THE CERVIX TREATED BY RADIUM THERAPY RESULTS AT THE END OF FIVE YEARS

Cl ss	N umbe Exam ed	T al N umbe Tre ed	A l l i f 5 years	D ied C ancer	D ied f c u r re nt D is e a	S urv E d f 5 yr	R a d i o t h e r T re at m e nt
St g I	36	36	3			88	88
Stag II	4	4	88	6	6	65	65
St g III	08	408	3	7	5	3	3
St g IV	4	17		06		85	7
T t l	5	7	601	8**			58

*Only 3 cases had supplementary roentgen therapy
 *Only cases had supplementary roentgen therapy
 †There was vid recurrence 5 as

Carcinoma of the fundus uteri. The technique is based on the same principle as that for the treatment of carcinoma of the cervix uteri except for the fact that the intra uterine distribution of the radium especially around the cornua is increased. Arrangement (c) of the former article is a good example of this. The time and tissue spacing is likewise the same.

The following doses reach the various critical points

A At 0.6 to 0.8 cm in the musculature of the fundus and the lateral walls of the corpus and 1.5 cm depth in the anterior and posterior walls. Total dosage 6600 roentgens

B At 1 cm depth in the musculature of the fundus. Total dosage 4600 roentgens

C On the peritoneal surface of the fundus. Total dosage 2640 roentgens

D On the peritoneal surface of the corpus. Dosage 4600 roentgens

The five year survival ratios are shown in Table II.

TABLE II—CANCER OF THE CERVIX TREATED BY RADIOTHERAPY RESULTS AT THE END OF FIVE YEARS

Stages	IG	th	N umbe Tre ed	Alive E d f 5 years	Per cent
Operable			7	7	100
Technically operable (surgery or radical)			33	5	15
Comb ed (rad)			40	5	12.5
Technically operable					8

Eighteen patients were treated by combined radium and roentgen rays. Of whom 7 were operable and 11 were inoperable. The living was lost 15.

All favorable cases (60 per cent) were treated surgically and with few exceptions only those unsuitable for surgery were referred for radiotherapy.

Since 1932 the employment of the complementary radium and roentgen rays or telurium therapy has been made general for carcinoma of both the cervix and fundus uteri. The figures given do not refer to such situation. T. L. C. T. A. M. D.

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Nylund, C. E., and With, T. K. On the Demonstration of Vitamin A Deficiency in Man. *Acta med Scand*, 1941, 106: 202

Dietary surveys are of value in the demonstration of Vitamin A deficiency in man, but it is only in extreme cases that such deficiency can be proved by this method.

The determination of Vitamin A in the liver gives, without doubt, the best possible information concerning the Vitamin A standard of the organism. If the liver reserve is low, one must look for clinical symptoms of Vitamin A deficiency, but such symptoms are not necessarily to be found even if the reserves are entirely lacking. On the other hand, clinical symptoms of latent Vitamin A deficiency may possibly be found in spite of considerable liver reserves and, if this is the case, even a rather considerable reserve in the liver does not exclude the existence of slight symptoms of latent avitaminosis.

The Vitamin A and carotene contents of the blood serum are not reliable indicators of the Vitamin A reserve of the organism and are only to be regarded as expressions of the power of the organism to mobilize Vitamin A from its depots. Consequently, low values for Vitamin A serum do not always mean Vitamin A deficiency, however, high values speak strongly against Vitamin A deficiency, except in the case of chronic nephritis, in which disease high values of Vitamin A serum may be found in spite of low depots. The significance of the serum carotene in the demonstration of Vitamin A deficiency in health and disease is not yet sufficiently known.

Some authors have claimed that it is possible to demonstrate latent Vitamin A deficiency by microscopical examination of corneal or conjunctival smears (pre-exeresis), but the value of this method has not as yet been established.

Night blindness is the initial symptom of Vitamin A deficiency in all mammalian species which have been examined thus far, and this seems also to be the case in man. Hemeralopia is, however, by no means a special characteristic of Vitamin A deficiency, since it is a general symptom of several eye conditions. On the other hand, it is correct to exclude Vitamin A deficiency in an individual with normal dark adaptation, as all cases of Vitamin A deficiency examined thus far by reliable techniques have shown unquestionable hemeralopia. Hence, for the present, stress must be placed on the number of subjects showing normal dark adaptation rather than on the number showing hemeralopia if the Vitamin A standard of a group of individuals is to be determined.

The principal points of the technique for the determination of Vitamin A in the liver and in the blood

serum, as well as for the demonstration of hemeralopia, are discussed.

De Blasi, A. Experiments on Traumatic Shock. Elevated Temperatures and Shock (Esperimenti sullo shock traumatico [Azione delle temperature elevate sullo stato di shock]). *Poliedin*, Rome, 1940, 47 sez. chir. 213.

In order to substantiate his clinical impression that the administration of heat to a patient in traumatic or postoperative shock does not always improve his condition but sometimes makes it worse, De Blasi produced traumatic shock experimentally in dogs and studied the influence of the external administration of heat. Under morphine narcosis (using 0.01 gm per kgm of body weight), shock was produced by 30 to 35 blows with an iron tube on the lower abdomen. Pulse, blood pressure, and temperature observations were made. Heat was applied after the induction of shock with warm moist compresses, care being taken to avoid burns. Shock, characterized by rapid pulse, low blood pressure, and low temperature, was fully developed in from twenty to thirty minutes after its induction and, within thirty to sixty minutes after the induction gradually diminished spontaneously, with restoration to normal in about three hours. In 2 of a group of 8 animals in whom heat was applied after shock had been established, no deviation was found from the normal course established in a group of 4 dogs in whom heat was not used. Of the remaining 6 dogs treated with heat 2 died following the use of heat, and 4 showed marked impairment of the blood pressure, although they finally recovered.

In order to explain his results the author mentions the previous findings of Rein, according to whom shock, which is temporarily compensated for by vasospasm in regions outside of the area of the shock-precipitating vasodilatation and by sudden blood removal from certain reservoirs (spleen, liver, and vena cava), may become fatal when an additional burden, as muscular work, leads to a disturbance of the delicate compensation mechanism. Thus, he believes, cutaneous vasodilatation, obviously produced by the external application of heat, disturbs this mechanism and brings about a turn for the worse in experimental shock in animals. He warns against any avoidable interference with the regulation mechanism in clinical shock, i.e., the induction of muscle labor or digestion, and interference with thermoregulation. HENRICH LANGE, M.D.

Agostinelli, E. Infestation with Round-Worms in Connection with Surgery (Contributo alla conoscenza dell'ascaridiasi chirurgica). *Poliedin*, Rome, 1940, 47 sez. prat. 1169.

The author reports a clinical case of ascariis infection, reviews the literature, and points out the prac-

tical importance to the surgeon of a knowledge of the surgical significance of this condition.

A three-year-old child was treated surgically for a congenital hernia and hydrocele on the right side. Under ether anesthesia a herniotomy was done according to the Bassini technique. On the third post-operative day the child had a chill and developed a fever which was associated with symptoms of delirium. On reopening the surgical wound no evidence of infection could be determined. An antelmintic was administered and the child passed some large long round worms. After this the temperature dropped to normal and the child recovered. The author states that the ether anesthesia probably excited the worms to increased activity with resulting liberation of their peculiar toxin which in children may induce fever, signs of meningeal irritation and even convulsions.

The author has reviewed the literature and notes that ascariasis infestation may cause occlusion and perforation of the intestine, perforation of the abdominal wall, peritonitis, appendicitis, cholecystitis and diseases of the liver and pancreas and even of the lung. Examples of such complications are cited in detail from the literature. As a result of such experiences the author suggests the advisability of examining the feces for ascariasis before any contemplated surgery. In such cases antelmintic treatment before surgery may eliminate serious difficulty in the post-operative course. JACOB F. KLEIN, M.D.

Wife U. J. and Holman H. H. A Survey of 68 Cases of Extragenital Chancres. *Am. J. Syph. G. & Ven. D.* 1941 25 58

In 841 cases of primary syphilis 68 or 8.0 per cent presented extragenital chancres.

Chancre of the lip is by far the most frequent as it occurred in 39 or 57.3 per cent of the total number of cases. One patient in this group was a male in the cancer age who presented himself for treatment of a cancer of the lip and who already had had radium therapy.

Chancre of the tonsil was presented by 10 patients 6 of whom revealed other evidence of syphilis. Several had been treated for streptococcal infection.

Digital chancre was present in 6 patients—3 of them physicians and 3 a nurse. The conditions having all been acquired during the care of patients with syphilis.

Two patients had chancre of the breast and a woman forty-three years had even been operated upon for carcinoma of the breast as he had presented her a typical picture of ulcerative lesions of the breast with involvement of the axillary nodes.

There was a chancre of the larynx in 2 cases, of the tongue in 5 cases and in the palm, forehead, chin and anus in 1 case each which accounts for the remaining 17 of the cases.

The failure of early diagnosis in these cases of extragenital chancre is emphasized. The presence of syphilis should always be considered in the face of any lesion in association with a regional lymphatic

enlargement which does not respond to ordinary therapeutic measures. A. DREW McVALLY, M.D.

Holldbo H. Tests of Vegetative Function after Post-Traumatic Dystrophy of the Extremities (Vegetative Funktionprüfungen bei Posttraumatischer Extremitätsdystrophie). *Nord. M. J.* 1940 p. 24

The vegetative nervous system which consists of the sympathetic and the parasympathetic nerves has among other functions vasomotor and sweat secreting functions. Both find themelves well to practical clinical research which has often been resorted to in the presence of peripheral and central lesions as well as traumatic and post-traumatic disturbances. Various procedures are used. Leriche has made use of the oscilloscope in vasomotor disturbances. Jensen has taken comparative skin temperature values in symmetrical areas of symmetrical extremities especially in vasoconstriction after injury. Verification is made with the cold test. The extremity is held in water at 15 degrees for ten minutes then the skin temperature is measured. When vasoconstriction is present the temperature remains low abnormally long but the opposite is true in inflammation in which condition the temperature increases much faster on the affected side than on the well side. In the case of fractures Jensen found an initial predisposition to vasoconstriction followed by hyperemia.

The chief procedure (according to Christian, Fog and Vangaard) is the immediate induction of cold and at the same time the addition of heat. The examination of the extremity is submerged at once in a cold box filled with a mixture of ice and water. The control extremity is placed in a vessel of water from 42 to 44 degrees. After the highest temperature of the skin is recorded a gradual cooling is produced after which the bath is interrupted. The temperature is taken as distally as possible on the extremity that is proximal to the nail and the terminal articulation since here the reaction of the smallest vessels is more sensitive than further above. However it was observed that the changes except those resulting from the smallest misfused subluxation and bruising are not exactly localized at the point of injury but quickly extend cephalad and in the severe cases the entire extremity becomes involved. The curves of the same measurements made by means of a firmly placed thermocouple are recorded. The changes of the skin temperature depend solely on the variation of the blood circulation i.e. the changes of the diameters of the smallest vessels. The determination of these variations is thus a useful method of Minor (1927). One hour before the test is to begin the patient is given a minute red and the skin area to be studied is painted with iodine solution (iodine 5, oleum ricini 10, alcohol absolute 10, a 100) then powdered with starch after which a pale color appears. Then the patient is caused to perspire (steam bath, foot or hand bath or hot tea).

The perspiration colors the painted skin bluish black. The contrast between the bluish black and the yellowish white area which is free from sweating is very striking and can be recorded photographically. The sweating so produced was centrally conditioned and depended on the intact nerve structure, so that a clear picture of possible injury within the vegetative nervous system was obtained. Pilocarpin, which is uncertain in its effects, acts more peripherally on the sweat secretion, similar to neurotomy but not like nerve degeneration. The centrally-conditioned sweating is independent of the circulation of the blood, i.e., the blood-pressure cuff placed on one side produces no changes on the other side. The sweat secretion is governed by the heat-regulatory mechanism. The sweating is usually simultaneous with hyperemia of the skin vessels. Perspiration in health appears simultaneously in symmetrical areas. Herein rests the applicability of the tests, which definitely show great individual variations: not all extremity segments perspire equally profusely, the palms of the hands and the plantar surfaces of the feet perspire only a little, the back of the hand and foot, and the finger, the forearm, and the leg, especially on the extensor surfaces, perspire profusely, the little finger and the thenar eminence perspire only moderately.

The author presents a series of results from research in dystrophy, subluxations, and single inflammations, 50 cases in all. All disturbances of the vegetative nervous system found thereby were not only vasomotor but comprised also the sweating function. In all of the cases of impending dystrophy there were vasoconstricting tendencies and places with diminished secretion. This condition is also found after injury or inflammation. In a single case, in the course of a mild subluxation vasoconstriction and increased secretion were observed throughout the entire period. Usually after a short time (a few weeks or months), the effects of the injury disappear, except in cases of demineralization, edema, or changes in the skin. In that case, the non-sweating area extends over the entire extremity. Otherwise, one can see a period of hypersecretion when impending disturbances are brought under control, even when one cannot prove the presence of vasoconstriction. These two conditions are in no way related. One may see vasoconstriction with diminished secretion as well as vasodilatation with increased secretion. Each condition suggests one imperfect function of the two functions of the vegetative nervous system, there may be others.

Great prominence should be given to the use of sweating experiments in the surgical clinic. They are procedures with which to trace the spread of disturbances after injuries and make it possible to intervene with suitable means such as novocaine injection. The advantage of these experiments rests upon the fact that they can be used anywhere by anyone and also that they do not cause any discomfort to the patient.

(RICHTER) H. H. GROSZKLOSS, M.D.

Janisch-Raškovic, V. Environment in Relation to Cancer Disposition and Cancer Age (Einfluss der Umwelt auf Krebsdisposition und Krebsalter) *Ztschr. f. Krebsforsch.*, 1939, 49, 598

On the basis of a series of 2,049 cases of genital cancer in women, the author makes a study of the influence of environment on the incidence and age of cancer development.

The series included 1,868 cervical carcinomas, 64 carcinomas of the corpus uteri, 37 ovarian carcinomas, 26 vulvar carcinomas, 19 vaginal carcinomas, 18 uterine sarcomas, 14 ovarian sarcomas, 1 tubal carcinoma, and 2 vulvar sarcomas. The so-called better classes were represented by 75.6 per cent of the cervical, 34.4 per cent of the corpus uteri, 13.5 per cent of ovarian, 10.5 per cent of the vaginal, and 11.5 per cent of the vulvar carcinomas, and by 38.8 per cent of the uterine, and 14.3 per cent of the ovarian sarcomas. Among 176 cases among the better classes, there were 76.7 per cent of cervical, 12.5 per cent of corpus uteri, 2.8 per cent of ovarian, 1.2 per cent of vaginal, and 1.7 per cent of vulvar carcinomas, and 4 per cent of uterine and 1.1 per cent of ovarian sarcomas. Of 1,873 cases of carcinoma among the poorer class group, 92.8 per cent were cervical, 2.84 per cent corpus uteri, 1.71 per cent ovarian, 0.91 per cent vaginal, 1.22 per cent vulvar, and 0.05 per cent tubal carcinomas, and 0.53 per cent uterine, 0.64 per cent ovarian, and 0.1 per cent vulvar sarcomas.

There were also many variations in the incidence of the different types of cancer in various groups of the population. In 1,525 cancer patients of the Southern Slavonic group south of the Danube and Save rivers, (formerly Serbia, Montenegro and Bosnia) (herein called the A₁ group) there was 93 per cent of cervical, 1.77 per cent of corpus uteri, 1.77 per cent of ovarian, 0.95 per cent of vaginal, 0.92 per cent of vulvar, and 0.06 per cent of tubal carcinomas, and 0.72 per cent of uterine, 0.72 per cent of ovarian, and 0.06 per cent of vulvar sarcomas. Among 332 cancer patients of similar descent from north of the Danube and Save rivers (formerly Hungary) (the A₂ group), the corresponding figures were 86.1 per cent cervical, 6.62 per cent corpus uteri, 1.8 per cent ovarian, 0.9 per cent vaginal, and 2.4 per cent vulvar carcinomas, and 1.2 per cent uterine, 0.6 per cent ovarian, and 0.3 per cent vulvar sarcomas. In 90 German cancer patients, (Group B), there were 83.3 per cent cervical, 8.9 per cent corpus uteri, 1.1 per cent ovarian, and 3.3 per cent vulvar carcinomas, and 2.2 per cent uterine, and 1.1 per cent ovarian sarcomas. Among 56 Hungarian patients, (Group C), there were 95.4 per cent cervical, and 1.8 per cent ovarian and vulvar carcinomas. In the 54 cases of Group D, made up of several nationalities, i.e., Roumanians, Greeks, Russians, Jews, cervical carcinoma comprised 76.1 per cent, cancer of the corpus uteri, 15.2 per cent, ovarian carcinoma and uterine sarcoma 4.2 per cent, and vaginal cancer, 2.2 per cent. Cancer of the body of the uterus appeared especially frequently in Russian patients of 14

uterine carcinomas 4 were of the corpus and in the 7 cases of uterine carcinoma in the Jews 2 were of the corpus. The better classes were represented in A₁ by 6.6 per cent in A by 1.4 per cent in B by 15.5 per cent in C by 3.6 per cent and in D by 39.1 per cent. The incidence of cervical cancer in the better classes was 87.1 per cent and in the poorer classes 93.6 per cent the incidence of cancer of the body of the uterus in the two classes was 5.9 and 2.84 per cent respectively. In Group A cervical cancer made up 73.2 per cent of the cases in the better classes and 87.9 per cent in the poorer classes cancer of the corpus uteri 14.6 and 5.5 per cent respectively. In Group B cervical cancer made up 50 and 89.4 per cent of the cases in the better classes and cancer of the body of the uterus 21.4 and 6.6 per cent respectively. In Group C there was no cancer of the body of the uterus while in Group D the figures for cervical cancer were 44.4 and 96.4 per cent and for cancer of the body of the uterus 38.8 and 0 per cent. Figures on the other types of cancer are also included in the tables.

In another section of the article the cancer patients are divided into 3 groups based on locality. Among 384 from Belgrade (I) with 21.1 per cent from the better classes there were 88.5 per cent cervical 4.68 per cent corpus uteri 3.0 per cent ovarian 1.04 per cent vaginal and 0.6 per cent vulvar and tubal cancers and 0.5 per cent uterine and 0.78 per cent ovarian sarcomas. Among 305 patients from the provincial towns (II) with 18.7 per cent from the better classes there were 84.3 per cent cervical 6.07 per cent corpus uteri 1.26 per cent ovarian and vaginal and 3.54 per cent vulvar cancers and 2.28 per cent uterine 1.01 per cent ovarian and 0.2 per cent vulvar sarcomas. Among 1196 patients from the rural districts (III) with 1.6 per cent from the better classes there were 94.1 per cent cervical 1.78 per cent corpus uteri 3.4 per cent ovarian 0.78 per cent vaginal and 0.86 per cent vulvar cancers and 0.55 per cent uterine and ovarian and 0.08 per cent vulvar sarcomas.

The difference between the poorer and better classes in the classification according to locality is indicated in all groups as follows: cervical cancer in the better classes Group I 81.5 per cent Group II 67.6 per cent and Group III 90.4 per cent in the poorer classes Group I 90.4 per cent Group II 88.2 per cent and Group III 94.2 per cent cancer of the corpus uteri in the better classes Group I 11.1 per cent Group II 6.2 per cent and Group III 4.8 per cent in the poorer classes Group I 2.9 per cent Group II 3.7 per cent and Group III 1.78 per cent.

Two relative tables classify the material from the various localities into social classes and derivation.

The review proves the following fact:

In the so-called better classes the incidence of cancer of the corpus uteri without respect to locality or derivation of the population is from three to four times as great as in the other groups. In the groups

A, B and D we find a constant higher incidence of cancer of the corpus uteri than in Group A. The relative frequency of corpus cancer is less in the rural group than in Groups I and II.

Further tables follow in which the author attempts to demonstrate the assumed absolute frequency of female genital cancer during the years from 1920 to 1935 in various sections of Yugoslavia and to detect sources of possible error. He arrives at the conclusion that the influence of environment on cancer disposition cannot be denied that conditions favorable for one type of cancer are unfavorable for another type (as for instance in the case of cancer of the cervix and cancer of the corpus uteri) and that a certain mode of life cannot cause cancer but can only increase or diminish the disposition to cancer.

The age of predilection for cervical cancer was between 36 and 50 years (63.9 per cent of the cases) the average age was 43.5 years 47.8 years for the better classes and 43.15 years for the poorer classes for Group A 43.2 years Group A₁ 44.8 Group B 46.1 Group C 42.2 and Group D 43.6 years for Group I 41.18 years Group II 46.45 and Group III 43.67 years. The age of predilection for cancer of the corpus uteri was between 46 and 60 years (65.6 per cent of the cases) the average age was 55.15 years 56.6 years for the better classes and 53.5 years for the others for Group A 52.8 years Group A₁ 54.5 and Group B 56 years and for Group I 53.2 years Group II 57 and Group III 53.1 years. The age of predilection for ovarian cancer was between 40 and 50 years in 38.8 per cent of the cases the average age was 45.6 years. Forty-two per cent of the vaginal cancers occurred between the ages of

46 and 55 years the youngest at 19 years and the average age was 38.8 years. The age of predilection for vulvar cancer was between 56 and 70 years in 46.1 per cent of the cases the average age being 58 years for uterine sarcoma the age of predilection was between 46 and 55 years in 61.1 per cent of the cases and the average age was 51.3 years. The age of predilection for ovarian sarcoma varied from 36 to 25 years in 50 per cent of the cases and from 36 to 40 years in 21.4 per cent the average age being 3.9 years.

The age of predilection and average age for all types of cancer in all groups of social classes and nationalities is discussed as a generalization. However the material is very small so that no conclusion is permissible. If one assumes that the younger age periods for cancer of the cervix and cancer of the corpus uteri for the poorer classes is related to premature aging of these classes it might be possible to explain the young age period for inhabitants of the capital and rural districts as compared with that of the town population of the same basis. The endurance of the women in the towns is not put so great a stress as that of the women of big cities and the country who often attend both to their household duties and to business or to work in the field which leads to exhaustion and premature aging.

(VILM JAKSCH RA KOVIC) EDITH SCHMIDT MOORE

Webb-Johnson, Sir A. **Pride and Prejudice in the Treatment of Cancer** *Brit M J*, 1941, 1, 1, 39

In the prevention of cancer much can be done by treating local and general conditions known to be precursors of cancer, and possibly also by excluding extraneous influences which may be remote causes. Once cancer has developed, however, the growth continues in spite of the withdrawal of any remote, non-essential cause. In our present state of knowledge only the local manifestation of the disease can be treated. Surgical excision often has the limitations of disfigurement, mutilation, and permanent disability. Radiotherapy attempts to check an otherwise irreversible process.

Early diagnosis is still the master key to success. This requires an opportunity to examine the patient and the application of skill and improved methods of clinical examination. Morbid histology is essential not only to diagnosis, but, with the grading of tumors, to prognosis, and possibly also to deciding upon the best line of treatment.

Cancer of the skin is essentially a local disease, since over 90 per cent of 800 cases of skin cancer observed had no glandular metastases when first seen. It should be remembered that skin cancer is often an outward sign of an inherent tendency to carcinoma elsewhere. Although radiation will cure a large proportion of skin cancers, surgical excision is the treatment of choice for a small primary lesion when disfigurement will not result. Recurrences of rodent ulcer after radiotherapy are more resistant to radium treatment than recurrences after surgical excision. Surgery should be resorted to immediately if the response to radiation is disappointing. Often in the excision and repair of large defects the surgeon is handicapped by impaired healing due to radiation. The treatment of nevocarcinoma has been disappointing. Many of these tumors are radiosensitive and radiation should be tried in all cases, but surgical excision with removal of the lymphatic drainage area offers the best chance. Prophylactic surgical excision of moles subject to irritation is advisable.

In cancer of the lip radiation yields a five-year cure in 65 per cent of all cases and in 90 per cent of Stage I cases. This is as good as or better than surgery, and healing is often obtained without loss of substance. Surgical excision should be employed if a considerable defect is inevitable and also when a case is not responding to radiation. Neck dissection is required only if the glands are palpable. In cancer of the oral cavity the results of radiotherapy are as good as those of surgical excision and are often secured without mutilation, which justifies the drift from surgery. With certain specified exceptions, the author believes that for cancer of the tongue, radiation of the primary lesion and operative removal of the lymphatic area only if the glands are or become palpable, gives the best prospect of cure. The best results of surgery and of radium in the treatment of intrinsic carcinoma of the larynx are about on a par. Extensive surgery entails mutilation

and disability, this is minimized with radiation. Most statistics do not distinguish between different types of tumors of the pharynx or give the exact location and consequently evaluation of treatment is difficult. Tumors of the nasopharynx, the vallecula, the pyriform fossa, the deep pharynx, and the base of the tongue often respond remarkably to radiotherapy.

Treatment of carcinoma of the esophagus by surgery has been disappointing, though there have been brilliant isolated successes. The tumor is of the same histological type as carcinoma of the cervix uteri, but in the former we are dealing with a thin-walled canal surrounded by vital structures. The tumor is very sensitive to radiation and its rapid destruction by direct radium treatment often leads to perforation. External methods of radiation are being tried more assiduously. There have been no lasting cures by radiation in proved cases. Turner advises that if the history is short and there is no evidence of metastases, and if improvement is rapid after gastrostomy, radical operation should be considered. The real hope for the future lies in finding some method by which radiation can be safely applied to this perilous region. The growth itself is vulnerable to attack, but a way must be found to protect the vital surrounding structures. Except as a preliminary to radical excision, gastrostomy is now seldom required, the method of intubation being the preferable palliative procedure.

Surgical treatment of carcinoma of the rectum may produce five-year cure in 83 per cent of the cases in Stage A and in between 40 and 50 per cent of all cases. While radiation therapy has produced brilliant results in a small proportion of operable cases, it is too uncertain to justify its use in operable cases. Unfortunately, the rectal mucous membrane is generally just as radiosensitive as the tumor.

A comparison of the best five-year and ten-year survival rates of radiation therapy and surgery in carcinoma of the cervix uteri shows that radiation produces the better results. The radical operation for carcinoma of the cervix is one of great difficulty, and few operators can attain the best results. Radiation treatment, on the other hand, can be duplicated with an adequate staff and equipment in many centers. Cases not responding to radiotherapy should be submitted to operation without delay.

In cancer of the breast results are excellent in Stage I cases, but if the axillary glands are involved over 60 per cent of the patients do not survive five years. Because of the extensive area to be dealt with external radiation has advantage over radium implantation. When considering reports of favorable results from external radiation alone, it should be remembered that as a rule the diagnosis is not confirmed by pathological study. There is no doubt that successful results can be obtained but the radiation should probably be supplementary to the surgery. Pre-operative radiation demonstrates which cases are radiosensitive, and these are just the ones in which radical surgery is likely to fail. The radia-

INTERNATIONAL ABSTRACT OF SURGERY

tion also decreases the vitality of the cancer cells previous to the operative disturbance. It may interfere with healing but this danger is minimized by resort to operation as soon as the preoperative course is completed. In regard to the full dose of radiation because of the surgical trauma and impaired blood supply and nothing less than the full dose is likely to be adequate. Some figures indicate that combined preoperative and postoperative therapy may be best. There is no question that rad therapy does good in some advanced cases but it adds to the patient's sufferings. Radiotherapy should never be used as a placebo or in obviously hopeless cases.

Because of the need for expensive equipment which is quickly out of date and the complicated methods of treatment cancer centers will become increasingly necessary. JOHN L. LINDQUIST M.D.

Barrett M. K. The Influence of Genetic Constitution upon the Induction of Resistance to Transplantable Mouse Tumors. *J Natl Cancer Inst* 194 1: 387

The induction of resistance to transplantable tumors in mice by a prior inoculation of homologous normal living cells was an early contribution to the study of cancer. Bashford Murray and Cramer reported the use of defibrinated blood to induce resistance by this method.

The mechanism involved has been the subject of extensive investigations but no generally accepted explanation has been evolved. Murphy has suggested that the phenomenon may be due to a type of sensitization and has adduced some evidence in support of such a conception. Whether this represents a cellular immunity in the ordinary sense remains an open question but it should be kept in mind that certain attributes of intact cells which depend upon their viability and integrity and is not just a matter of specific proteins or other cell constituents. This interpretation presupposes a degree of genetic difference between the cells injected and the host as a basis for the reaction.

Now that strains of mice are available which are relatively if not entirely homogeneous it is possible to test the effect of genetic differences upon the phenomenon and to make some inferences in regard to the influence of genetic homogeneity. It is important to do so because there is little chance of applying the principles involved to the control of the naturally occurring diseases if the mechanism proves to be a sensitization phenomenon.

The work presented by the author was undertaken in order to observe some effects of genetic differences upon the phenomenon under discussion. This was done by comparing the growth of grafts of three transplantable mammary carcinomas in mice of three strains. Test mice of each strain were immunized with blood of their own strain or with that of the

other strains and the results compared with each other and with those obtained with control animals. With the two pure line tumors used no significant resistance could be induced in an inbred mouse against a tumor derived from the same strain. The author's findings favor the belief that the mechanism involved is a sensitization type of phenomenon and depends upon the foreignness of the tissues used.

The evidence obtained by the author's experiments together with that of previous work is given force to the most important implication of this work which is that the search for a means of treating human cancer based upon these principles e.g. by autoplasmic grafting or with sensitizing injections is likely to prove a fruitless one.

JOSE H. K. NAR T. M.D.

Overgaard K. and Okkels H. The Action of Dry Heat on Wood's Sarcoma. *Acta rad* 194 2: 577

Tissue culture techniques have indicated that certain tumors are less resistant to heat than normal tissues. Westermarck moreover demonstrated that thermic action on an inoculated tumor has a selective destructive influence.

The authors' experiments were performed on mice inoculated on the tail with Wood's sarcoma and treated by the application of heat locally to the tumor. Diathermy short wave diathermy and ultra short wave diathermy were used which varied the temperature from 42 to 46 C and the time from five to sixty minutes. The results indicated that a moderate application of heat has a specific tumor destroying effect in doses harmless to normal tissues. This effect depends solely on the temperature time combination used and is independent of the frequency of the current. Heat combined with roentgen therapy produced a beneficial effect when the doses of both components were limited to subtherapeutic levels. The authors stress the point that the dosage of treatment used lies well within the limits of what may be employed for human therapy.

Histological investigation reveals the effect of heat to be vascular congestion together with shrinkage of the neoplastic cells which eventually become transformed into a granular mass and disappear. The nuclear changes do not begin before from twenty to thirty minutes and are complete after one or two days. The surrounding tissues show essentially no change.

STANLEY FOR RUS M.D.

DUCTLESS GLANDS

Iandol C. Hypophyseal Syndrome of Traumatic Origin (Sall). *Endocrinol* 194 47: 422. *Polid* R. m. 940 47: 422 med.

The author reviews a number of hypophyseal syndromes brought about by trauma among the ones described in the literature and gives historical cases of his own. His own cases are as follows:

1 A man of fifty-three at the age of twenty-nine had been struck a violent blow in the left temporoparietal region. Four months later he began to note marked polydipsia and polyuria and increasing weakness and anorexia. In 1937 a roseolous eruption developed on his thighs and abdomen, consisting of many hemorrhagic petechiae. On admission to the hospital in January, 1939, he was in a condition of extreme cachexia, he died February 8. Autopsy showed a hematic cyst in the anterior lobe of the hypophysis.

2 A man of thirty-three in May, 1938, while riding a bicycle fell violently to the ground striking on the right supra-orbital region. In December of that year he began to notice intense thirst and later intense polyuria. He was treated with extract of the posterior lobe of the hypophysis and improved greatly.

3 A woman of forty-five in January, 1927, was struck by a tramcar and dragged for some distance. Among other injuries there was a large lacerated and contused wound in the left parieto-occipital region. A condition doubtless due to injury of the hypophysis developed, consisting of adiposity, hypertrichosis of the masculine type, polyglobulia and hyperglycemic polyuria, increased basal metabolism, signs of intracranial hypertension, and moderate chronic meningitis and visual disturbances, the latter symptoms doubtless caused by slight hemorrhages.

The cases described in the literature show all types of hypophyseal syndromes, both of decreased and increased function. Cases of hypophyseal syndrome due to trauma are not nearly so rare as they were formerly believed to be, though they are still rare in comparison with the total number of brain injuries. They generally develop gradually and the history of trauma is frequently overlooked. They are sometimes incorrectly diagnosed as traumatic neuroses. They are caused most frequently by gunshot injuries of the head, fractures of the base of the skull, or lesions incurred during operation in the sellar region. The trauma generally causes hemorrhage of the hypophysis. Because of its copious blood supply the hypophysis bleeds easily and because of its softness it is easily crushed against the bones. The possibility of such injuries of the hypophysis in trauma should be borne in mind and a search made for them if any suspicious symptoms develop.

AUDREY G. MORGAN, M.D.

Antognetti, L., and Patrono, V. The Influence of Implantation of the Pituitary Gland on the Urinary Elimination of a Substance Producing Hyperglycemia (Influenza dell'impianto di ipofisi sulla eliminazione urinaria di una sostanza ad azione iperglicemizzante). *Pohlman*, Rome, 1940, 47 sez. prat. 1075.

The authors had found and reported previously that a substance producing hyperglycemia is excreted in the urine of normal individuals, and that in cases of eosinophil adenoma of the pituitary gland its amount in the urine is decreased.

In order to study the influence of pituitary implantations on elimination, the authors aseptically removed the pituitary glands of young calves immediately after the killing and grafted them into the anterior rectus sheath of human subjects. While the influence of such transplantations on the hormonal balance is only temporary, as these are heterografts, it is doubtlessly present. The human subjects thus studied were children with pituitary physical and genital underdevelopment. The authors found that pituitary implantation makes the excretion of the hypoglycemia-producing substance in the urine in hypopituitary subjects more like the type found in normal persons in subjects with an abnormally low output of this substance, it increased after transplantation, while it decreased in those with an abnormally high excretion. In a case of hypopituitary disturbance of growth, diabetes insipidus and diabetes mellitus, transplantation of the calf hypophysis resulted in a reduction of diuresis, the restoration of renal concentration ability to normalcy, but an increase of relative and absolute glycosuria.

The authors interpret their findings as a support of their theory that there is a pituitary influence on production, utilization, and elimination in the urine of the hyperglycemia-producing substance.

HEINRICH LAMM, M.D.

Belasco, I. J., and Murlin, J. R. The Effect of Thyroxin and Thyrotropic Hormone on the Basal Metabolism and Thyroid Tissue Respiration of Rats at Various Ages. *Endocrinology*, 1941, 28 145.

Thyrototoxicosis was induced in rats by the subcutaneous injection of thyroxin. The thyrotropic principle of the anterior pituitary lobe was injected subcutaneously into other rats. Body weight loss and increase in the metabolic rate varied with the age of the animals. The body weight loss and hypermetabolism of young rats during the administration of either thyroxin or thyrotropic hormone were less than those produced in older animals. In spite of weight loss the weight of the thyroid gland increased with administration of the thyrotropic hormone. Normal thyroid tissue respiration showed a rapid decline after a rat was four months old. In the older rats thyroxin decreased and thyrotropic hormone increased the amount of oxygen consumption by the gland.

These results indicate that the administration of thyroxin will depress thyroid respiration, even though it elevates the general metabolic rate. The authors suggest that the thyroid gland of individuals who take thyroid over a long period of time may be unable to return to an active state after cessation of the medication. These individuals may be compelled to continue thyroid medication in larger amounts.

The clinical implication is that patients who need thyroid treatment might benefit only temporarily from intermittent injections of thyrotropic hormone along with the ingestion of desiccated thyroid gland.

Richter C P and Schmidt C H Jr Increased
Fat and Decreased Carbohydrate Appetite of
Pancreatectomized Rats *Endocrinology* 94
28 179

While on the self selection diet most of the animals manifested a marked appetite for fat, little or no sucrose and had an increased appetite for yeast. The average intake of carbohydrate was 19 per cent of fat 56 per cent and of proteins 25 per cent.

The authors concluded therefore that the rats by their dietary selections worked to correct the diabetic symptoms.

of Urinary Estrogen
Quantitation of Glucuronide
Excretion in 1945-1955

are chemically interrelated the masculinizing ones called androgens and the feminizing ones called estrogens which both are present in man and woman. The best known androgenous substances in the urine of man are androsterone and dihydroandrosterone both are also found in the urine of woman. The best known estrogenous substances in the urine of woman are (apart from estradiol) estrone and estradiol; the author investigated also estrone and estradiol in the urine of man. However, that both are also found in the urine of man. However, his study has revealed that while the androgenous activity of the urine of man compared to the estrogenous activity of the urine of man comes out that of the urine of woman shows a ratio of 1:1.75 compared to that of the urine of woman shows a ratio of 1:3.73. In other words woman has more male in her than man has female and this agrees with the clinical concept of Marfan to the effect that a woman is more male than man.

Frazer C N and Hu C K Increased Resistance to Syphilis in the Rabbit Following Prolonged Administration of Urinary Estrogens 1 Fem

That pregnancy apparently enhances natural resistance to lymphis further emphasizes the importance of the sexual factor to the defensive reaction. We have assumed for the reasons stated that some endocrine function peculiar to the female and intimately related to gestation plays a dominant rôle in the defensive mechanism. One of the striking phenomena of pregnancy is the elaboration of large quantities of estrogens. With the possibility in mind that estrogenic hormones might have an

MISCELLANEOUS

important functions in the development of the body's resistance to syphilis, either directly or indirectly, these experiments were undertaken. Adult male rabbits subjected to the action of urinary estrogens were infected with *treponema pallidum*. In the first of two experiments, the early physiological effects of the estrogenic preparation were found to coincide with a modification of the severity of the disease. These results led us to the opinion that the influence of estrogens on infection was indirect and probably related to the tissue changes which they induced, especially those in the testes. Upon this assumption a second experiment was performed in which inoculation was deferred until there was evidence of the full physiological effects of estrogens. These included well defined signs of feminization as exhibited by changes in the sexual organs, and by the development of secondary sexual characteristics.

Mammary glands. The first manifest effects of treatment were related to the nipples and the mammary glands. Enlargement of the former began almost at once, and by the sixteenth day of treatment had progressed to the size found in pseudopregnancy. At this stage a clear secretion could be expressed from the nipples of many animals. By the eightieth day of treatment the nipples were approximately as large as those of a lactating female rabbit.

External genitalia. A decrease in the size of both testes was appreciable as early as thirty days after treatment was commenced, but in most animals this change was not apparent before eighty days of treatment. After fifty days of treatment the glans penis softened, and the urinary meatus began a process of elongation. Preceding these changes the prepuce appeared red and edematous for several days. Shortening of the glans progressed together with ventral cleavage until the corpus cavernosum urethra had receded into the depths of the prepuce. After one hundred and fourteen days of treatment the urethra could be everted and the mucosal surface rolled easily onto the outside of the shaft of the penis. By the time one hundred and fifty days of treatment had elapsed the glans had disappeared with the exception of two lateral tags which were the remnants of the cavernous bodies. Later, these also disappeared.

Psychosexual behavior. The feminized males were more docile and passive than normal males. When placed with does they acted with indifference toward them and in no case attempted copulation. They fled from normal males that attempted copulation, and occasionally uttered sharp cries when attacked. In one case copulatory actions of a normal male were terminated by ejaculation, but no spermatozoa could be found in the vestibulum-like structure of the feminized male.

DISCUSSION

In general the changes induced following injections of estrogens on adult male rabbits were progressively in the direction of feminization. The

response of different tissues and organs in a succession of orderly changes may be interpreted as indicating a variation in the threshold of susceptibility, which was dependent, perhaps, upon the degree to which pituitary function was stimulated or depressed by the estrogens.

The prominent anatomical alterations observed among the estrinized animals were related for the most part to the genital organs and to the mammary structures. The external genitalia were reduced to a form resembling that of the female rabbit. The involution of the scrotum and partial ascent of the testes returned the animal to a sexually neutral condition approaching that of early life.

The changes in the mammary structures were equivalent to those induced in normal female rabbits by pseudopregnancy. There was enlargement of the nipples, and growth of the primary ducts and rudimentary glands. Stimulation of a secretion grossly indistinguishable from milk occurred especially in the animals of the first experiment. Similar nipple and mammary growth has been produced in some species by the action of estrone and estrinol. However, only in the guinea pig, of the species extensively studied, has estrone been observed to cause complete growth of the mammary glands.

Although the development of the mammary glands is dependent primarily upon the action of estrogen, the initiation and maintenance of lactation has been shown to be a function of the anterior pituitary lobe. The appearance of milk in many of the male rabbits of these experiments demonstrated that the estrogens, or some other substance present in the urinary extract, influenced secretion, either directly or by stimulating the release of the lactation-producing factor of the anterior pituitary lobe. However, the prolonged administration of estrogenic substance exerted the opposite effect, as the secretion ceased or became irregular during the latter part of the period of treatment. Besides, in the second experiment the extract failed to induce the same quality of secretion as it had in the first.

Although there was considerable individual variation in the rate and degree of response to the estrogens, the difference between the animals of the two experiments with respect to lactation was too great to be due to chance alone. Whether or not aging of the extract was a factor influencing this difference would require investigation. This possibility is suggested because of the time elapsing between the two experiments, approximately fourteen months. On the other hand, the absence of any other important difference in the response to treatment in the two experiments points against this being a factor. The age and breed and general care of the rabbits in both cases were essentially the same. There remains, however, the possibility that the difference in the size of the dose of estrogen was sufficient to account for the variation in the character and amount of secretion in the two experiments. It has been suggested that small quantities of estrogen affect the anterior pituitary lobe in such a way as to promote the

secretion of the lactation factor. In this connection it has been shown that the administration of large doses of estrogen results in a decrease or total disappearance of mammary secretion in the rabbit.

The mode of action of the estrogens on the gonads and accessory sex organs is attributed to the depressant effect on the anterior pituitary lobe which results in the inhibition of the secretion of the gonad stimulating principle.

In the second experiment the course of syphilitic infection in two groups of adult male rabbits homogeneous as to breed, age and nutrition was studied. Before intratesticular inoculation with *Treponema pallidum* one group of animals was subjected to prolonged treatment with an estrogenic substance prepared by extracting human pregnancy urine with butyl alcohol. The animals were injected daily with the ether soluble fraction of this extract dissolved in olive oil. The estrogenic content of the preparation was assayed by means of the vaginal growth effect on ovariectomized albino rats. The physiological effects of the estrogenic substance were manifested in the growth of the nipples and the mammary glands together with the stimulation of lacta-

tion, the feminization of the external genitalia and atrophy of the testes, the development of a dewlap, a secondary sexual characteristic of the female rabbit, and in certain changes pertaining to psychosexual behavior.

Among the rabbits treated with estrogens the early manifestations of syphilis were much milder and followed a shorter course than among the sexually intact rabbits. The former showed an increasing ability to withstand the injurious effects of the disease the longer they were treated. This was shown by the greater frequency with which they failed to develop generalized foci of infection.

The resistance to disease developed by the testis was the most noteworthy modification of the reaction to infection, although the skeletal and cutaneous tissues behaved in a similar manner. The period of latency was greatly prolonged among the treated animals and they remained in a better state of nutrition.

The possibility that testicular changes induced by estrogenic action are directly related to the inhibition of infection is discussed.

JOHN A. LOEF, M.D.

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PRINCIPLES OF SURGICAL PRACTICE

ANOXIA—ITS SURGICAL SIGNIFICANCE

HERBERT C CHASE, M D, F A C S, New York, New York

AS one comes to the end of the third decade of the Era of the Surgeon Physiologist he finds that volumes have been written relating to the application of basic physiological concepts to clinical surgery. Water-salt regulation, and acid-base balance have been reduced to simple rules and chemical equivalents. Shock and dehydration are now measured in terms of specific gravity and by hematocrit index. Yet, with all these developments and advances, one of the most life-sustaining and life-giving agents, oxygen, has been neglected by most surgeons.

HISTORY

Galen (180 A D) taught that the blood leaving the right ventricle passed through the "artery like" vein to the lungs, mixed with the air to form the "vital spirits" (28). During the lifetime of William Harvey (1578-1657) respiration was considered the cooling system for the blood. Boyle, in 1666, demonstrated that without air, life is impossible. John Mayow, in 1674, established the true principles of the physiology of respiration, and described the "nitro-aereal spirit" in the air and its absorption by the blood in the lungs (22). In 1774, this "spirit" was isolated in pure form by Priestley and called dephlogisticated air (24). Lavoisier, in 1777, also isolated the gas in pure form, named it oxygen, and taught that it combined with carbon to form carbon dioxide and produce, by this reaction, animal heat (18). Following the work of Priestley and Lavoisier, oxygen was hailed as a panacea for all the ills of man and thus it was not long before oxygen therapy fell into disrepute. Interest in oxygen from a thera-

peutic standpoint was revived during the World War by the work of Barcroft, Haldane, Hunt, Dufton, Stokes, and others.

The physiology of respiration. In presenting the subject of anoxia in a "clinical" journal and to a purely clinical group one may be justified in describing briefly the physiological mechanisms of respiration.

Le Gallois, in 1882, described and established the site of the respiratory center in the medulla (19). This center, the *folliculus reticularis*, which is located in the floor of the fourth ventricle, is a loosely arranged group of nerve cells with intercommunicating fibers and with an abundant vascular supply. The centers are connected directly with the principal efferent and afferent nerve pathways, and with fibers from the carotid and aortic bodies through the vagus and the cranial nerves. They are under both reflex and chemical control. The basic cause of rhythmicity is found in the blood itself, and it is now certain that the two centers continue their intermittent discharges when all sensory nerves are severed. Although basic rhythm rests upon chemical factors in the blood, the rate and duration of their motor discharges are continually influenced by sensory impulses pouring into the medulla over the afferent nerve pathways (Figs 1 and 2).

The most powerful of these are the sensory impulses which arise in the lungs themselves. In 1868, Hering and Breuer (6, 16) described sensory receptors (Fig 3) in the smooth muscle spindles in the walls of the bronchioles throughout the lungs, which are mechanically stimulated by lung inflation and muscle stretch, and send a series of impulses to the respiratory centers.

through the vagus. The rate of impulse discharge increases as inflation and stretching progress. The central effect of impulses arriving from the lung receptors is to stop the activity of the respiratory centers. The outflow of motor impulses to the inspiratory muscles is cut short by the sensory impulses from the inflating lungs which increase in intensity as inspiration proceeds. Finally the sensory impulses literally smother and inhibit the motor activity of the centers; inspiration ceases and expiration begins. Thus the lung is protected against overinflation by its intrinsic governor mechanism just as the brain is guarded against excessively high blood pressure by the carotid sinus mechanism at its vascular gateway.

The carotid sinus reflex is second in importance to the Hering Breuer reflex. Two distinct sensory nerve pathways arise in or near the sinus; their fibers reaching the medulla over the ninth and tenth cranial nerves (Fig. 2). In the arterial wall lie receptors which are stimulated by the stretching of rising blood pressure. In the carotid bodies near by and receiving arterial blood through small and abundant vessels lie other receptors influenced only by the chemical changes in the blood itself (carbon dioxide hydron concentration, oxygen lack). This dual system plays an important rôle in the mechanism of respiration. As changes in the blood occur or blood pressure rises (from any cause) nerve impulses travel up to the respiratory centers and partially or completely suppress their rhythmic activity. The effect of rising blood pressure is in the same direction as the effect of lung inflation. As the blood pressure rises the depth of inspiration decreases. If the blood pressure rise continues respiration ceases (apnea) to recur only when the blood pressure begins to fall. As the blood pressure is further lowered respiration increases in rate and amplitude.

CHEMICAL FACTORS IN RESPIRATION

Both the carotid and aortic bodies recently discovered chemoreceptors represent persistent remnants of an old chemoreceptor system found in the gills of our marine ancestors. They were formerly associated with the vascular arches rising through the gills from the aorta and appear in the human body as vestigial organs during embryonic life greatly modified to form the aortic arch and carotid arteries of the adult. The chemoreceptor (corpus carotidus and corpus aoticus) cling to them in the two regions and shift their function from the fluid of the external environment to the arterial blood of the internal

environment. They consist essentially of glomus tissue or thin walled sinusoidal spaces without a muscular coat but the walls contain many nerve endings which are sensitive to chemical and pressure changes.

Heymanns and Schmidt and their coworkers have recently been able to distinguish between the mechanical receptors of the sinus wall and the chemical receptors of the carotid bodies (27). The two sensory receptor systems although anatomically near together (Fig. 2) are entirely independent of each other in function and do not necessarily act at the same time. The principal chemical factors affecting the carotid bodies themselves are carbon dioxide tension, alterations of the hydron concentration of the blood and oxygen lack.

Increased carbon dioxide. The gas carbon dioxide is intimately involved in the chemical control of respiration. High blood carbon dioxide tension has its major effect directly on the respiratory center but also has a direct chemical effect upon the carotid bodies. The rhythmic activity of the respiratory centers depends upon a number of chemical factors (VS). Into this equilibrium carbon dioxide enters in a very important way and while it is not the sole blood borne chemical agent involved it is by far the most important. Since carbon dioxide is being continuously produced in all living cells it is constantly being formed in the neurons themselves and when its concentration in these cells its effect will depend on the rate of blood flow through these nerve centers. When the flow is rapid and carbon dioxide is readily dissipated respiration becomes slow and shallow. When the blood flow is slow the reverse occurs.

Blood borne carbon dioxide may come to the respiratory centers from other organs e.g. from muscles during exercise when lactic acid of the blood operates as a secondary chemical stimulant. Furthermore the blood vessel of the medulla are sensitive to both carbon dioxide and oxygen lack and in common with other blood vessels of the brain dilate in response to both. As muscular activity continues the blood flow through the respiratory centers increases and the acid condition of the nerve cells is somewhat relieved (second wind).

Oxygen lack. The great increase in rate and depth of respiration at high altitudes is well known. This is a further example of chemical stimulus. It occurs at the very time when overentilation causes carbon dioxide to be rapidly blown out of the blood and when the latter is rapidly turning alkaline (pH 7.8). So the hy-

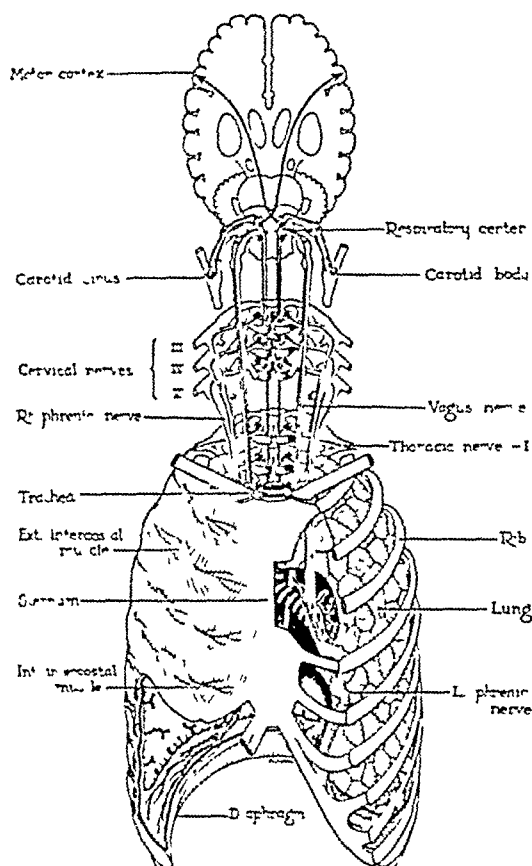


Fig 1 Principal reflex pathways involved in the control of respiratory movements. Sensory nerves in red, motor nerves in black.¹

perpnea cannot be due to the carbon dioxide or other acids, but to the direct effect on the carotid body of oxygen lack when the oxygen of the air falls to 13 per cent or less. This corresponds to an altitude of about 11,000 feet. Sensory discharges travel to the medulla over fibers of the ninth cranial nerve and these impulses are increased as oxygen lack becomes more extreme. This stimulates the respiratory centers and respiration increases rapidly in rate and amplitude. The value of this mechanism is obvious: the oxygen tension in the alveoli is raised, and the supply to the blood maintained. If bilateral denervation of the carotid bodies is performed, the oxygen pressure in the lungs and blood may be reduced to the point of asphyxia and death with relatively little effect on the respiratory movements.

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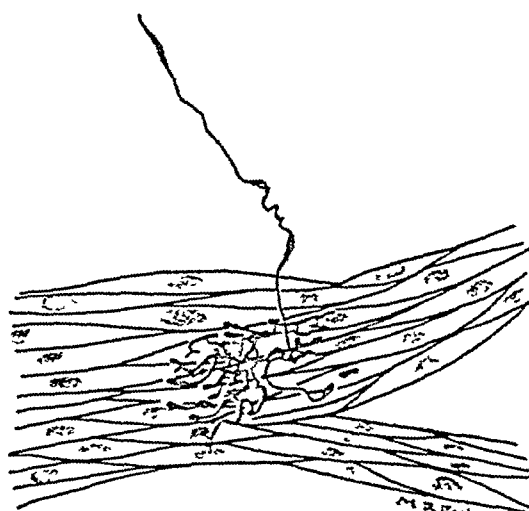


Fig 2 Smooth muscle spindle in wall of bronchiole.²

TRANSPORT OF THE RESPIRATORY GASES

The transport system of the respiratory gases is one of those fascinating and amazing mechanisms of mammalian physiology which words are inadequate to appraise. It is unique and wonderfully efficient in its correlated interdependent factors:

- 1 The properties of hemoglobin (chemical and physical)
- 2 The construction of the red blood cell itself
- 3 The oxygen diffusion gradient.
- 4 The "give and take" relationship of carbon dioxide and oxygen in the tissues and in the lungs.

"The more hemoglobin is studied the more precisely do its properties conform to those of the ideal respiratory pigment. In the interior of the red blood cell it exists in a world all its own. By this device, nature has at one stroke increased the efficiency both of the blood and of the hemoglobin" (Joseph Barcroft, 2). Hemoglobin is the carrier of the reserve supply (19.5 per cent by volume) of oxygen of the blood, and the remainder (about 5 per cent by volume) is in simple physical solution in the plasma. From this latter source all oxygen is delivered to the tissue cells, and all oxygen combined with hemoglobin in the reserve must enter into solution with the blood plasma before being available for cellular respiration. The constancy of this oxygen volume in physical solution (5 per cent) and its efficient maintenance is therefore, of paramount importance.

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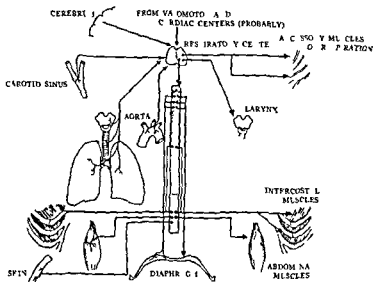


Fig 3 S n ryp thways ffecting th resp at ryce t rs (F om Best and Taylo Will ms & Wilk C)

Each red blood cell is like a little ship with its crew of 240 000 000 men (hemoglobin molecules) transporting 960 000 000 bales (oxygen molecules) on its journey through the blood stream to the tissues where it unloads one third of its cargo and picks up new cargo (carbon dioxide) for the return voyage it thus shuttles back and forth between the lungs and the tissues always carrying cargo to and from the living cells

This efficient transportation depends on the peculiar construction of the ship itself as well as the very nature (Fig 4) of its crew First of all it is a relatively large ship (the SS RBC) which carries a large crew of many small men (hb molecules) each inherently capable of handling his four bales of cargo The shape and construction of the ship give it a large surface for quick loading and unloading combined with considerable internal volume (90 cu microns) The crew is imprisoned and cannot leave the ship and so well guarded they cannot mutiny The RBC holds hemoglobin within its membrane so that it cannot escape into the plasma and be lost The blood concentration of hemoglobin is thus maintained As for the crew each man has a truck (divalent ferrous iron) with the capacity of loading four bales into the ship at one time

Hemoglobin is a conjugated protein its molecule consisting of four smaller units each with a molecular weight of 17 000 Each unit consists of the haem molecule (Fig 5) containing a single atom of divalent ferrous iron (the truck) linked

to a much larger colorless protein globin Each ferrous atom is able to hold a molecule of oxygen Hence each hemoglobin molecule can unite four oxygen molecules forming oxyhemoglobin The hemoglobin of muscle has a higher affinity for oxygen than blood hemoglobin but muscle hemoglobin loses carbon monoxide ten times as rapidly as blood hemoglobin although their affinities are about the same (3) The 960 000 000 oxygen molecules carried by a single red cell will occupy a space of 25.5 cu microns of the oxygen if they are taken from the cell and measured as gas Since the whole red cell has a volume of 90 cu microns oxygen occupies a space of 35.5/90 or approximately 40 per cent of the volume of the cell In normal blood each red blood cell is surrounded by an equal volume of plasma containing no hemoglobin and 5 cu microns of oxygen in solution In each 180 cu microns of whole blood (90+90) therefore we find 36 cu microns in all the oxygen then is 36/180 or 20 per cent of the volume of whole blood These estimates closely agree with direct analytical data (e.g. Van Slyke method) The oxygen capacity of the blood then is 20 volumes per cent This represents full capacity or saturation under normal conditions The oxygen content of the blood is rarely equal to its capacity and is often considerably less

OXYGEN DIFFUSION GRADIENT

Under normal conditions there is a steep gradient of oxygen pressure from the atmosphere

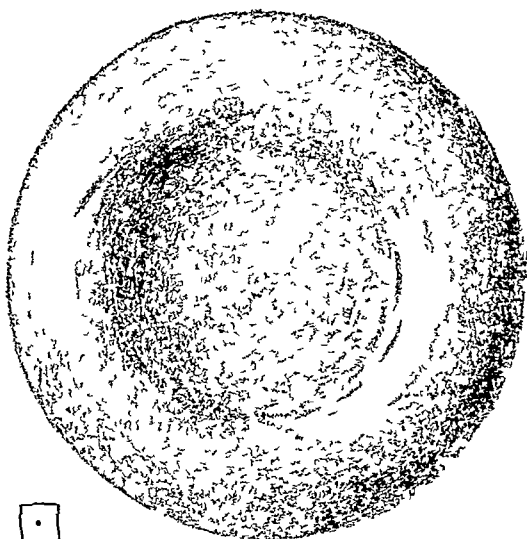


Fig 4 Human red corpuscle $\times 5625$ Size of hemoglobin molecule drawn to same scale indicated by tiny dot within square at left below¹

through the lungs descending steeply to the tissue cell. This can be represented by the flow of water from the great lakes to the sea (Fig 6). This gradient is from 160 mm of Hg in the atmosphere, to 100 mm of Hg in the alveolar air, and from 95 mm of Hg in the aorta and arterial tree, down to 40 mm of Hg in the capillary bed. This last drop from 95 mm to 40 mm of Hg in the capillary bed maintains the "head" which insures its delivery through the capillary wall into the tissue spaces, where it is taken up as free oxygen into physical solution (5 per cent by volume) to be utilized by the tissue cells. In alveolar air with oxygen pressure of 100 mm, hemoglobin is not fully saturated. The association value is 96 per cent (Fig 7) of full saturation. As the arterial blood passes downward through the vessels, the "head" of gas steadily declines, and as it passes into the tissues it enters regions of active oxygen utilization and low oxygen pressure. In fact, the oxygen pressure in many organs and tissues is close to zero.

The amount of oxygen actually in association with hemoglobin varies as the oxygen pressure is changed. A series of estimates made to show the relationship of the oxygen content of the blood at varying oxygen pressures may be "plotted" and is called a "dissociation curve" (Fig 7). In other words, the dissociation curve, which could

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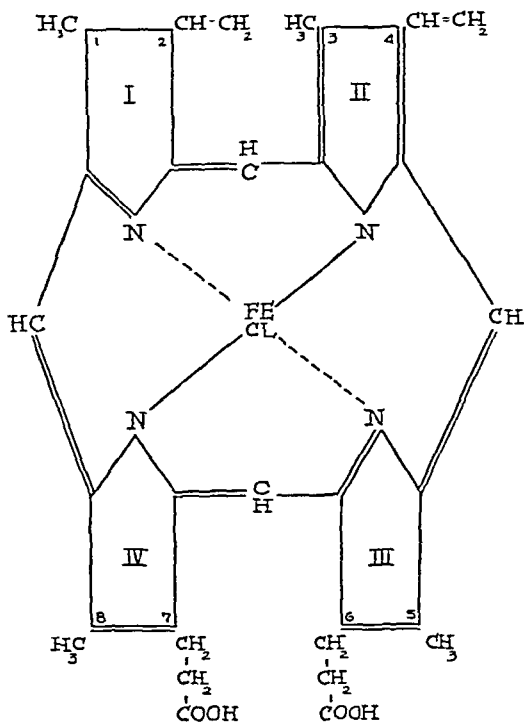


Fig 5 Hemin

be more appropriately called an association curve, shows the degree of saturation of oxygen at the various pressure levels. This is of great practical importance in oxygen therapy as it will at once be noted that increased pressure rapidly increases the degree of saturation. The outstanding and more remarkable fact, however, is the ability of hemoglobin to combine with much oxygen even at low pressures. The amount of oxygen in combination is by no means directly proportional to the pressure of the gas. Hemoglobin picks up oxygen at low pressure and this property is of crucial physiological value (the crew is willing and will always load if cargo is available). It protects us against low oxygen pressures of high altitudes.

In the capillaries the hemoglobin gives up about one-third of its oxygen before it reaches the thicker walled veins where further loss is prevented. The oxygen content of venous blood, therefore, has fallen to about 65 per cent saturation with a pressure of 35 mm of Hg (Fig 7). As the venous blood enters the lungs, the oxygen pressure rises again to 100 mm of Hg. Hemoglobin is resaturated, after which the shuttle begins again.

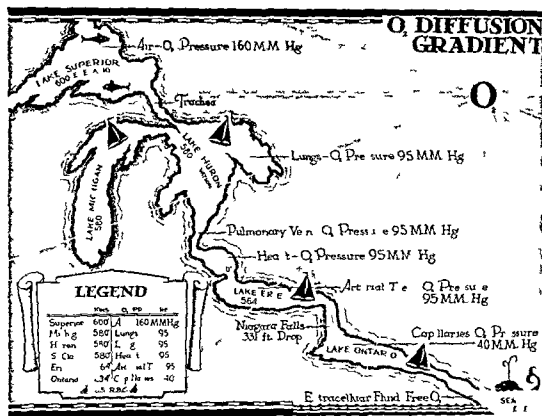


Fig 6

THE TRANSPORT OF CARBON DIOXIDE

As a result of cellular oxidation carbon dioxide gas is continually being formed in all living tissues and diffused into the blood. Arterial blood of man contains 44 volumes per cent and the venous blood of man 52 per cent by volume. This extra carbon dioxide (8 volumes per cent) is lost from the blood during its passage through the lungs. Hemoglobin is responsible for the transport of most of the carbon dioxide as only a small amount is carried in physical solution. Most of the carbon dioxide reacts chemically with hemoglobin. A small amount unites with the plasma proteins. The carbon dioxide attaches itself to free amino (NH_2) groups to form carbamino compounds. The largest part of the freshly generated carbon dioxide dissolves in the tissue fluid passes into the capillary blood and enters the red cell. Within the cell part of it unites with water to form carbonic acid. It should now be recalled that hemoglobin being a weak acid and having somewhat stronger acidic prop-

erties when its iron atoms are combined with oxygen exists in the red cell interior as potassium hemoglobinate having combined with the cation (K^+) of the red cell interior. The carbonic acid then reacts with the KHb to form hemoglobin and potassium bicarbonate ($\text{KHb} + \text{H}_2\text{CO}_3 = \text{HHb} + \text{KHCO}_3$). This reaction is greatly facilitated in three ways. First hemoglobin losing part of its oxygen in the tissues becomes a weaker acid and less able to compete with the stronger carbonic acid for the base (K^+) of the red cell interior. Second some of the bicarbonate ions newly produced within the red blood cells diffuse out through the cell membrane into the plasma. Since the cell membrane is not permeable to cations the K^+ ions cannot accompany them. Instead chloride ions diffuse inward exchange with the bicarbonate ions as they diffuse out until a new equilibrium is established across the cell membrane. The chloride shift is thus produced by the bicarbonate shift which is the driving force of the entire mechanism (Fig 8)—the

OXYGEN THERAPY

General considerations Unfortunately it is all too common to find surgeons indifferent to or unaware of the great value of oxygen therapy. If interested at all the verbal order is given without specific direction as to concentration, rate of flow or method of administration. It is apparently not realized by them that many of the most used methods of administration, the funnel and the nasal tubes, can deliver only from 40 to 50 per cent oxygen and a good deal of this volume is lost in the surrounding atmosphere.

Other surgeons seem to believe with the layman that the oxygen tank is to be dragged in only when the patient is *in extremis* and the family gathered for the demise. This group, which fortunately is growing smaller, seems to believe that the main virtue of oxygen is to make dying easier and that the main indication for its use is the death rattle.

Dangers of oxygen therapy In normal experimental animals and in normal human subjects the inhalation of pure oxygen at a pressure of 1 atmosphere over a period of five or six hours is productive of serious effects: impaired vision, rise in the blood pressure, pulmonary edema, convulsions and collapse. Seventy per cent oxygen given to normal subjects over a period of four days may also produce harmful effects. Eighty per cent oxygen given over long periods of time to normal animals has been shown to produce myocardial damage and pulmonary edema.

The anoxic individual, however, reacts differently and with great benefit and gratitude to oxygen therapy. Boothby has shown that 100 per cent oxygen can be given over long periods of time and with great benefit to anoxic patients if administration is not continuous for more than two days. After two days lower concentrations should be used. Barach (1), Fine, Banks, Herman (10) and many others have reported the use of oxygen in 95 per cent concentration for long periods of time without toxic effect and with great advantage to the surgical patient. Most observers are now agreed that concentrations of 80 per cent or more are most beneficial as long as anoxemia persists and that concentrations of 50 per cent or less are of no value.

Principles of oxygen therapy The basic principle of oxygen therapy is the maintenance of an ample supply and head of oxygen in the alveolus and an intact transport system in order that it may be delivered with sufficient speed and pressure into the tissues of the body. The normal capillary oxygen pressure (40 mm. of Hg) must be maintained so that the final gradient is constant

and free oxygen is delivered speedily into the tissue fluids in quantity and in pressure sufficient to maintain in the plasma a volume of 5 per cent at all times. Only then will the tissue cell not be deprived. It is the free oxygen in physical solution in blood plasma that forms the final link of life. The oxygen combined with hemoglobin is only the reserve from which this tissue oxygen is being constantly replenished. The reserve must be kept at maximum and the transport system kept on schedule. In anoxia the tissue cell suffers not so much from the lack of oxygen as from lowered tension which interferes with efficient delivery. By inhalation of from 95 per cent to 100 per cent oxygen the oxygen saturation of arterial blood can be increased from 10 to 15 per cent.

METHODS OF ADMINISTRATION

The use of a pressure gauge graduated in liters per minute and the water bottle to add moisture, the latter being important to prevent drying and discomfort in the mucous membranes, are now standard advantages. The funnel and metal nasal tubes (placed in the nares) by which most of the oxygen is lost in the atmosphere are fast disappearing. The most useful and satisfactory apparatuses for oxygen administration are:

- 1 The oxygen chamber: this is efficient but expensive and unnecessary.
- 2 The oxygen tent: capable of delivering and maintaining pressures from 70 to 75 per cent of oxygen. This is expensive and explosive.
- 3 The oronasal catheter: is simple and efficient. It is capable of delivering from 60 to 70 per cent of oxygen. It must be carefully placed under direct throat vision, measured, marked and fastened. It must be watched and kept in place.
- 4 The B.L.B. mask: is capable of delivering up to 100 per cent oxygen. It is simple and efficient, inexpensive and easily adjusted (Figs 12, 13, 14). Nursing and feeding are simple when it is used.

TREATMENT OF THE VARIOUS TYPES OF ANOXIA

The successful treatment of anoxia depends entirely and directly on the differentiation of the type and the recognition of its cause and of the conditions associated with it. It is not enough to administer oxygen; one must correct the underlying condition causing the breakdown in the loading, the transport and the final delivery.

- 1 Anoxic anoxia: frequent in surgery, especially during anesthesia, calls for oxygen under pressure sufficient head to restore the lower alveolar oxygen tension and overcome fatigue of the respiratory centers which rarely require additional support (atropine, lobeline).

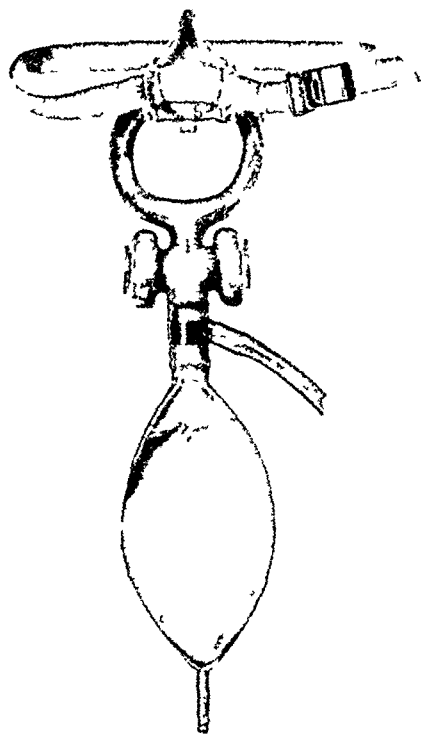


Fig 12 B.L.B. mask with two turrets, each for a sponge rubber disc¹

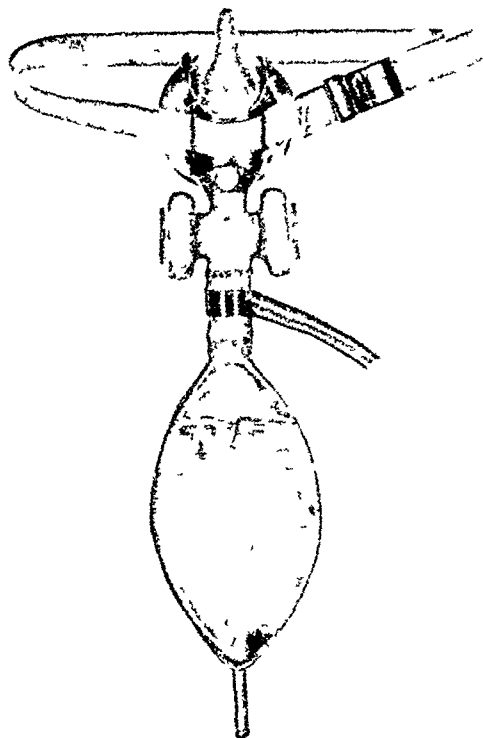


Fig 13 B.L.B. oronasal mask with a double turret for sponge rubber discs¹

2 Anemic anoxia calls for transfusions, restoration of blood volume and hemoglobin, plus oxygen therapy.

3 Stagnant anoxia requires measures to restore the falling blood pressure, the circulation, and the cardiac output (saline infusion for shock or dehydration, plasma transfusions, cortin, digitalis), which must be combined with oxygen therapy, best to be started first and ended last.

4 The treatment of histotoxic anoxia must include withdrawal of the poison and specific antidotal medication, together with a high percentage of oxygen to insure full plasma oxygen concentration, in order that cells not entirely destroyed and otherwise unscathed may be aided in carrying on cellular respiration until restored. Oxygen therapy in this type of anoxia should be carried out over a longer period of time than in any other.

The most reliable criterion of successful oxygen therapy is gradual and steady decline in the pulse rate. Other striking features are a steady and rapid decline in the temperature and the respiratory rate, pronounced sedation, diuresis, and marked improvement in the general condition.

If these results are not obtained, the method and percentage of oxygen delivery should be carefully scrutinized, and if adequate the diagnosis of anoxia should be doubted. It should ever be kept in mind that oxygen therapy is of no use unless delivery of oxygen to the tissue cells is assured.

OXYGEN THERAPY

In the surgical patient anoxia is, by far, the greatest single hazard. Oxygen therapy lowers the mortality and greatly decreases the morbidity. The prevention of anoxia is of prime importance. This should not mean by the anesthetist only. Oxygen therapy should be carried out in all indicated cases as soon as the patient is admitted, and continued up to the time of anesthesia, throughout this period, and in higher percentage during the postoperative recovery. Only too often the anesthetist is given a patient already anoxic and in acidosis or alkalosis, or having a reduced blood volume because of dehydration and in a state of stagnant anoxia. At other times, he is given a patient with anemic anoxia, or this

¹Reproduced by courtesy of Dr W. M. Boothby.

Brain cells are irreparably damaged if anoxia continues from eight to ten minutes. The centers of the brain survive for a longer period from twenty to thirty minutes and the spinal centers from forty to sixty minutes. Even moderate degrees of anoxia produce headaches, visual disturbances, irrational states, delirium and hyperpyrexia and if prolonged coma and death. Coma supervenes when the oxygen saturation of the blood falls to 24 per cent or less. The brain cell needs only salt, glucose and oxygen for its metabolism but the latter two continuously.

Recently Thorner and Levy (30) of the School of Aviation Medicine, U.S. Army, have reported the results of their experiments showing the effects of sublethal periods of pure anoxia on cats and guinea pigs. Vascular and degenerative changes in the nerve cells of the cerebral cortex were described and depicted after immersion of the animals in pure nitrogen for various periods.

Other observers have reported destruction of the cortex and basal ganglia, sclerosis of the pyramidal cells and in extreme cases massive necrosis of the cortical layers (21, 8, 25).

Cardiovascular system. The myocardial coordinating mechanism is extremely sensitive to oxygen lack and requires under normal conditions five times the amount of oxygen needed by skeletal muscle. During periods of great activity the myocardium requires as much oxygen as the entire remainder of the body. Normal heart muscle requires an abundance of glycogen and large quantities of oxygen for its metabolism. The myocardium with fibrosis of its muscle and sclerosis of its vessels demands a greatly increased oxygen supply.

Krogh (17) has pointed out that anoxia increases the permeability of the capillaries. This is an important consideration especially in the stagnant type of anoxia and greatly adds to the difficulty. There is a loss of blood volume with concentration of corpuscles in the capillaries and a reduced volume flow which further reduces the delivery of oxygen to the tissues and thus a vicious circle is established. Krogh further states that the capillary stasis resulting from oxygen deficiency is irreversible after fifteen minutes. The need of early oxygen therapy is apparent. We find then that stagnant anoxia is a type met with most commonly and strikingly in cardiovascular lesions and in conditions of reduced blood volume (shock and dehydration) and lowered cardiac output existing both as cause and effect.

If surgery is to be undertaken in the cardiac patient with the possible addition of shock and

dehydration the hazard is great and the demand for oxygen extreme and oxygen therapy in high value should be instituted early and continued for a long period.

Respiratory system. Anoxemia here shows its first effects. There is at once an increased rate and amplitude of respiration. This reduces the alveolar and arterial carbon dioxide tension and results in an increased affinity for oxygen (Bohr effect). Eventually the hyperpnea decreases the pulmonary ventilation and shallow breathing and cyanosis develop along with mental disturbances, muscular inco-ordination, coma and death. Concomitant with these respiratory effects there is a steady gradual rise of blood pressure with increased pulse rate and variations in the volume of the individual beats. These volume variations are irregularly spaced (the Brice syndrome (5) in anoxia Fig. 11).

When the heart can no longer sustain the increased volume output the blood pressure gradually falls as the aortic body reflex mechanism is brought into play. This picture differs from that produced by excess of carbon dioxide in which there is a steep and rapid rise of blood pressure with an equally rapid descent as the hyperpnea rapidly throws out the excess carbon dioxide. In this syndrome there is a hard bounding pulse gradually becoming softer as the blood pressure falls but showing no variation in individual beats (Fig. 11).

Gastrointestinal system. The effect of anoxia on the gastro-intestinal tract is to produce nausea, vomiting, diarrhea, intestinal cramps and distention. (These effects will be further discussed under therapy.) The liver has the greatest reserve and greatest regenerative power of all the organs. Anoxia is destructive to both. Certain anesthetic agents produce hyperglycemia. (If the splanchnic nerve fibers to the liver are cut hyperglycemia does not occur.) This is a defense mechanism and normally in the human subject (after general anesthesia) the blood sugar gradually declines within a few hours, the restoration being brought about by cessation of the secretion of adrenaline and by the compensatory production of insulin. Gellhorn and Packer (13) have shown that anoxia greatly interferes with this restoration and constitutes an added hazard to the surgical diabetic.

Anoxia and kidney function. It is well recognized that anoxemia is a part of all conditions which affect the blood supply of the kidney and a factor in the alteration of function produced by ischemia or by passive congestion. All those conditions which impair renal function—cardiac fail

CHASE ANOXIA—ITS SURGICAL SIGNIFICANCE

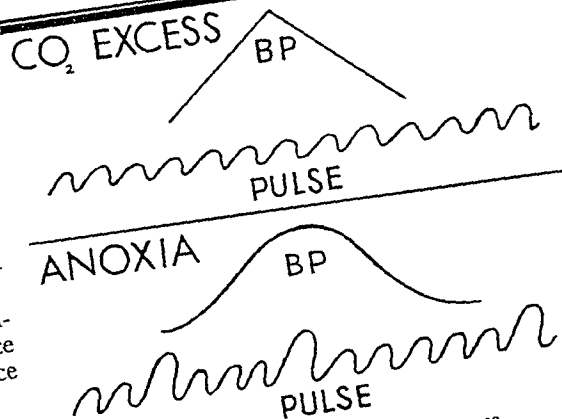
The BRACE SYNDROME
IN ANOXIA

Fig. 11 The Brace syndrome in anoxia

ure, dehydration, and toxic agents, are associated with stagnant or histotoxic anoxia. However, it should be emphasized that anoxemia, *per se*, directly impairs kidney function and leads to oliguria. Oxygen therapy greatly promotes diuresis.

Anoxia in febrile states. With a rise of each degree of temperature, there is an increase in the basal metabolic rate of from $+5^{\circ}$ to $+7^{\circ}$. This increased demand for oxygen is an important consideration in the surgical patient especially in prolonged fevers, and in the toxic thyroid patient in whom a greatly increased demand for oxygen already exists.

Anoxia and acid-base balance. Normal acid-base balance cannot be maintained in the presence of anoxia. The mechanisms for the maintenance of acid-base balance are:

- 1 The buffer system of the blood
- 2 Elimination of carbon dioxide by the lungs
- 3 Selective excretion of fixed acids by the kidney

Of these defense mechanisms, most important is the buffer action of the red blood cell itself (bicarbonate shift). An adequate head of oxygen is required to effectively maintain this mechanism. Moreover, acid-base imbalance is most often associated with states of dehydration and hyperpyrexia, in all of which anoxemia is an inherent part.

Anoxia and the adrenal cortex. The main function of the adrenal cortex is to regulate the water and potassium-sodium ratio, the blood-sugar level, and the stability of the interstitial fluid. Anoxia greatly diminishes the output of desoxycorticosterone. This fact plus the effect of anoxia on cellular respiration itself makes the effect of anoxemia on the adrenal cortex a pernicious one and one of the principal concerns of the surgeon in the maintenance of blood volume.

THE CLINICAL PICTURE OF ANOXIA AND ITS
EARLY DETECTION

The surgeon is greatly indebted to the anesthesiologist who not only has kept alive the interest and maintained the link between the work of Barcroft, Haldane, and others in oxygen therapy during the World War, but has done most of the spadework in emphasizing the importance of the entire subject of anoxia and has taught us much regarding its recognition and treatment.

No one sign or symptom is in itself an unfailing indicator of the onset of anoxia. The entire composite picture must be patched together and evaluated. In gradually developing anoxia under general anesthesia, there is an increase in rate and

amplitude of respiration associated with a gradually rising blood pressure and pulse rate with variation in volume of the individual beats (Brace's syndrome, Fig. 11). If anoxia continues, gradual fall of the blood pressure with rapid, shallow respiration and feeble rapid pulse and, finally, coma and death result. The patient's color is the last and least important consideration. Cyanosis is neither guide, index, nor criterion of anoxia. In fact, patients often die of anoxia without cyanosis. It depends not on the ratio of the amount of reduced hemoglobin to oxyhemoglobin in the blood, but upon the absolute amount of reduced hemoglobin present. Normal blood contains 15 mgm of hemoglobin per 100 c cm. When 5 or more mgm per 100 c cm are reduced hemoglobin, cyanosis appears. The woman with a bleeding fibroid with a hemoglobin of 30 per cent dies of anoxia "pure white." She has not enough hemoglobin to produce a maximum 5 mgm per 100 c cm and cyanosis does not appear even in death. On the other hand, the man with polycythemia vera who has a hemoglobin of 120 and 10 million red blood cells is cyanosed at all times and yet is without anoxia. He has plenty of oxygen and plenty of carriers but more than 5 mgm of hemoglobin exists as reduced hemoglobin at all times and he is constantly cyanotic.

In severe rapidly developing anoxia the effects are immediate and rapid increase in the respiration and pulse, rapid rise of the blood pressure, muscular twitching, convulsions, cardiac inhibition, fall of the blood pressure, coma, and death.



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type combined with an added histotoxic anoxia from one of the sulfonamide drugs. Thus the negligent surgeon may add to the hazard of the patient and the difficulty of the anesthesia.

Waters, Wineland and SeEVERS (31) have grouped the causes of anoxia particularly pertinent in anesthesia and to the surgical patient:

- 1 A high basal metabolic rate due to fever, fear, toxemia and pain.
- 2 A reduced pulmonary alveolar surface due to disease or mechanical compression from position.
- 3 Poor oxygen carrying power of the blood.
- 4 Cardiac insufficiency.
- 5 Obstruction of the respiration due to edema, inhaled mucus, fluid or vomiting.
 - a Laryngospasm.
 - b Defects in the anesthetic apparatus.
- 6 Anesthetic technique.
 - a Respiratory depression.
 - 1 Deep anesthesia.
 - 2 High spinal block.
 - 3 Central depression from morphine sulfate or barbiturates.

PREVENTION OF POSTOPERATIVE PULMONARY COMPLICATIONS

Lemon (20) has pointed out that 1 of each 50 patients operated upon for abdominal lesions

develops some form of pulmonary complication and 1 of each 185 will die from it. The highest incidence is in upper abdominal operations and in cases in which tight strapping, painful splitting of the diaphragm or morphine and relatives have contributed to hypoventilation. Lemon and Marroch made two important practical observations: A full moveable lung is a safe lung and the closer the approximation of vital capacity to tidal air, the greater the risk of postoperative pulmonary complications. The use of oxygen during anesthesia and early in the postoperative period has greatly reduced both the incidence of anoxia and the mortality.

In general anesthesia the rise in rate of respiration, the steady rise of the blood pressure and the appearance of the Brace syndrome will be quickly interpreted by most anesthetists and promptly corrected. In the spinal patient (7) it is very necessary to maintain an ample supply of oxygen and a high alveolar oxygen tension from the beginning to the end of the anesthesia and for six to eight hours thereafter. With a drop in the blood pressure there immediately ensues a stagnant anoxia of considerable degree. Furthermore if the spinal block should be intent or ascent go high enough to obliterate the diaphragm and accessory respiratory muscles, there is added the anoxic type of anoxia with hypoventilation and lowered alveolar oxygen tension. Both conditions demand continuous inhalation of oxygen in high percentage. The nausea and vomiting of spinal anesthesia is due to anoxia and quickly relieved by oxygen with gratification of both patient and surgeon. The use of 100 per cent oxygen over a period of from twenty-four to thirty-six hours postoperatively will prevent postoperative spinal headache in nearly every instance.

Enough has been said of the value of oxygen therapy in shock, hemorrhage, dehydration and acid base imbalance. Boothby (4) lists the surgical conditions which can be benefited by early inhalation of 100 per cent oxygen as head ache following encephalography, profuse pulmonary edema, massive collapse of the lung, pulmonary embolism and infections due to anaerobic organisms.

The value of oxygen therapy in postoperative abdominal distention, ileus and intestinal obstruction has now become convincingly established. All of us have had the gratifying experience of noting in some of our seriously ill patients after abdominal section that there has been a striking absence of distention, nausea and vomiting when for some pulmonary complication they have been given continuous oxygen therapy.

CHASE ANOXIA—ITS SURGICAL SIGNIFICANCE

Approximately 70 per cent of the gas in the intestine is nitrogen. Whenever 100 per cent is inspired, the partial pressure of nitrogen in the lungs is reduced quickly to practically zero from the normal 570 mm of Hg. As a result, the nitrogen of the blood plasma diffuses into the alveoli and is expired because a gas always diffuses from a higher pressure into a region where pressure of that particular gas is lower. Consequently, the reduced pressure of nitrogen in the arterial blood allows this gas to diffuse into it from the gut. From the blood it passes out through the lungs.

McIver, Redfield, and Benedict (23) in 1926 (basing their work on criteria established by the experimental work of Exner in 1875, Stefan in 1878, Hufner in 1897, Boehr in 1909, Krogh [A and M] in 1910, and Krogh, A in 1915) set down their postulates regarding gaseous exchange between the blood and the lumen of the stomach and intestines.

1 An equilibrium will be reached when the partial pressure of gas in the lumen is equal to the mean tension of the gas dissolved in the circulating blood.

2 The rate at which gas passes through a permeable membrane at any time will be proportional to the difference in pressure of the gas on the two sides of the membrane.

3 The actual value of the rate at which the gas passes across the membrane is, for any given pressure difference, determined strictly by the volume of the gas and the area and thickness of the membrane.

Then, McIver *et al*, by a series of experiments with ligated loops of intestines in cats, studied diffusion rates of carbon dioxide, oxygen, nitrogen, methyl hydride, hydrogen sulfide and hydrogen. In all cases, there was a change in volume and composition of the gas in the obstructed loop. These changes depended on (1) absorption of injected gases, and (2) diffusion of blood gases into the lumen until an equilibrium was established. The rates of absorption for the various gases were in order of rapidity carbon dioxide, hydrogen sulfide, oxygen, hydrogen, and methyl hydride (slowest).

Nitrogen exists in the blood and the air in high tension and very little change is required to bring the nitrogen injected into the gut lumen into equilibrium with that in the blood stream. However, when experiments were carried out with the animal breathing through a spirometer and a high percentage of oxygen, the rate of absorption of nitrogen from the loop was considerably increased. Fine, Frehling, and Starr (11), in 1935

in a series of experiments on rabbits, showed that the inhalation of pure oxygen rapidly lowers the nitrogen tension in the blood and thereby increases the pressure difference and, therefore, the rate of absorption from the gut lumen into the blood. This fact is of great clinical importance because it has been shown that the largest component of intestinal gas is nitrogen.

Later, Fine, Hermanson, and Frehling (12), in 1938, showed by clinical trial that postoperative distention and the distention of intestinal obstruction was diminished from 60 to 70 per cent in twenty-four hours by the inhalation of 95 per cent oxygen.

OXYGEN THERAPY IN THYROID SURGERY

The greatest of all sedatives for postoperative thyrotoxicosis is oxygen. The high basal rate, the rapid pulse, the hyperthermia, all demand oxygen in large volume. The air hunger, the restlessness, the burning fever, the fright, and the fear are relieved as if by magic. The pulse rate and temperature steadily decline, the myocardium is greatly fortified, and the general condition markedly improves. Specific remedies, ergotamine and lugols, all have their value and indications, but edly improve. It should be given in conjunction with any or all, is oxygen. It should be given in high percentage, from 95 to 100 per cent and continuously for the first few days and until the pulse rate is well controlled and all toxic symptoms disappear.

Haines and Boothby (14) have pointed out that after thyroidectomy, about 2 per cent of the patients develop tracheal and laryngeal edema, pulmonary edema, bronchopneumonia, or cardiac insufficiency. Oxygen inhalation (100 per cent) is of great benefit in such conditions and is of greatest value when administered early. A rapid crisis-like drop in the temperature, decreases in the pulse rates, and general improvement occur with subsidence or limitation of the process.

COMMENT

Anoxia is today the greatest single hazard to the surgical patient.

Oxygen therapy lowers the mortality and decreases the morbidity in surgery. A good "head" of oxygen should be maintained in the alveoli of all surgical patients in whom anoxia is or may become an added hazard, and this is a large percentage of such patients.

Pre-operative oxygen therapy in the anoxic patient diminishes the risk of operation and of anesthesia, and decreases the incidence of post-operative pulmonary complications.

Successful oxygen therapy depends on differentiation of the type of anoxia the immediate institution of measures for relief of its cause the use of high concentration precise delivery and its early employment

SUMMARY

A brief outline of the physiology of respiration the etiological classification of anoxia its significance in surgery and its treatment general and specific is given

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- 3 GELLHOR E I P C A R R A S t u d s t h I t a c t f H y p o g l y c e m a n d A n x i A m J P h y s l 194 1 0 6 0
- 4 HAINES S F d BOOTHBY W M The A l l f O y g e n T m n t f t T h y d e t m y A m J S g 1929 6 1
- 5 HALDANE J S d P R I E S T L Y J R p r a t A w e d i t n N w H Y l e U r s t y P r e s s 93
- 16 HERRING E U b e r d n B u W b l i t l b r S t z g s b d k A k d d W s e s c h M t h t r w C l s 54 W 866
- 7 KROGH A The A n a t m y & P h y s l o g y f t h e C p u l l n N H e Y a l e U n e r s t y P r e s s 99
- 8 LAVOISIER A Q u t e d b y B R A C E D F The S g i f i c a t e f O y g n t S u g c l P t n t s W e s t V g i n i a M J 1940 36
- 9 LE G A L L O I S C J E p e r i e n s u r l p r i c i p l d e l T r I A d C h P i s
- 20 L F M O W S T h A t f P o s t p e r a t u P u l m o a r y D i s e P o p h y l a x i a f T r t m t l E u t r m a C B d B l f o D C T h S t m a c h a d d O d u m P h l a d e l p h W B S n d r s C 935
- LOWE B E R G C W G O V E R R a d Z B Y D E V H The D s t r u c t o f t h e C b r a l C r t f l l w i n g N u t r O d e O y g A t h e s a A n n S g 936 04 8
- 2 MAYOW J Q u o t e d b y A m b r s W R d S m i t h D C O u t l f P h y s i l g y B a l t i m W i l l m s n d W l k C 94
- 23 M E L V E M A R E I F L D A C a d B l E D I C T E B C a s e o F h g b t n t h B l o o d l t h L u m e n of t h S t m c h n l I n t e s t i n e s A m J P h y s l 9 6 76 92
- 24 P I S T V J T R Y S c L o d 7 p 47
- Q U A S T E J H R e s p t t h e C t r i N e r v s S y s t e m P h y l R e 939 19 135
- 26 R E I D L C A n e s t h R i t n t C a d D i s s e A n t h e l g y 041 2 6
- 27 S C H M I D T C F E f f e c t f C a r o t i d S a d C a r o t i d R d y R e f l e x R s p a t A s & A n l 940 9 6
- 28 S I C K C C e k B l g y d M l c N e w Y k O f f d U r s t y P r e s s 938
- 29 S Z E T G r o y r A o O x i t t l F e r m t a t P r s p e c B o c h m 938 0
- 30 T H O M A S W I L E V Y F H The E f f e c t s of R e p e t d A t h e B r a i n H i p t h l g i c S t d y J A m M 94 5 595
- 3 W A T E R S R M W I N E L A N D A J a d S E E V E R M H C a r b o D d n d O y g l b l m s A s t h i a A n s & A l 93

ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

HEAD

Perruelo, N. N. Facial Paralysis from Fracture of the Petrous Bone (Parálisis facial por fractura de peñasco) *Rev de ortop y traumatol*, 1940, 10 215

Two cases of paralysis of the facial nerve from fracture of the petrous bone are described, one in a boy of thirteen and the other in a woman of forty-nine. Both patients had suffered severe injuries of the head, and the paralysis began some days after the injury and receded spontaneously. These cases occurred among a total of 35 fractures of the skull, that is to say, in 5.71 per cent of the cases. Fracture of the petrous bone may occur alone or it may radiate from fractures of the vault.

If the fracture line is perpendicular to the axis of the bone and pierces the inner third it may cause facial paralysis of the peripheral type, which affects the frontal and orbicular muscles, and the muscles of the nose. In some cases there is inhibition of the lacrimal secretion on the side of the injury, almost always epiphora, deviation of the tongue to the injured side, loss of taste and vasomotor disturbances of the two anterior thirds of the tongue, decrease of the salivosecretory reflex, difficulty in mastication, deglutition, and the pronunciation of some words, and possibly paralysis of the soft palate. In addition to this there may be vestibular symptoms, such as buzzing, dizziness, nystagmus, deafness, staggering gait, and a positive Romberg's sign.

If the fracture line is perpendicular and at the junction of the external with the middle third, passing through the middle ear, there is deafness or defective hearing, buzzing in the ears, and facial paralysis.

If the lesion is at the level of the geniculate ganglion there is paralysis of the muscles of the face,otalgia, and hyperacusis.

If the injury is below the geniculate ganglion, lacrimal secretion is preserved and there are no vasomotor, secretory, or sensory disturbances of the tongue.

Longitudinal fractures may give the same symptoms, but the labyrinth is almost always intact and the prognosis is generally good for life and hearing. Facial paralyses may be bilateral and may be accompanied by paralysis of the external oculomotor nerve. Otorrhagia is frequent in this type of fracture.

The roentgenogram is often of value in diagnosis, although the petro-auricular suture may simulate a fracture line.

The more quickly the facial paralysis appears in fracture of the petrous bone the worse the prognosis. If it appears within forty-eight hours it is almost

always permanent and the cranial trauma is often fatal. If it does not appear for from four to fifteen days it is generally benign and disappears spontaneously without leaving any sequelae. Cases have been described in which a facial tic persisted.

Treatment is useless for if the cases are mild the paralysis disappears spontaneously and if they are severe treatment is not effective.

AUDREY G. MORGAN, M.D.

EYE

Macnie, J. P. Ocular Lymphogranuloma Venereum. *Arch Ophth*, 1941, 25 255

Lymphogranuloma venereum is probably a much more common venereal disease than is generally recognized. It is caused by a virus of large particle size which has been grown in tissue culture. The development of antibodies is indicated by the result of a Frei test, which is a reliable indicator of infection with the virus at some time, but does not reveal whether the disease is active at the time of the test.

Cases of lymphogranuloma venereum showing conjunctivitis, retinal hemorrhages, episcleritis, and peripapillary edema have been reported. Nine cases are here reported of patients with Parinaud's oculoglandular syndrome who were also infected with the virus of lymphogranuloma venereum. In 4 of these the conjunctival secretion or excised conjunctival tissue was shown to contain the virus. A series of 30 patients with keratoconjunctivitis and uveitis were subjected to the Frei test. Of these 4 reacted positively and were found to have rectal symptoms consistent with lymphogranuloma venereum. Other pathological conditions in all 4 cases could have accounted for the ocular symptoms but lymphogranuloma venereum was an etiological possibility in 3 cases.

In an experimental study keratitis and uveitis were produced in the eyes of 13 of 10 guinea pigs by injecting infected mouse brain emulsion into the anterior chamber, but the infection could not be produced in other eyes by transfer of aqueous, when introduced intracerebrally. Symptoms of the disease were produced in white mice.

WILLIAM A. MANN, M.D.

EAR

Asherson, N. The Cochlear Nerve and the Vascular Theory of Nerve Deafness. *J Laryngol & Otol*, 1940, 55 531

The indivisibility of the cochlear nerve must be challenged if the inviolability of the "all or none law" in regard to nerve stimulation is accepted.

Nerve deafness manifests itself by a loss of perception for high tones the low tones being perceived normally in many cases. Thus only a part of the cochlear nerve is involved.

According to Asherson this fact alone would justify the supposition that the cochlear nerve is not a single pure entity but a composite nerve consisting of at least two main nerves one part concerned with the transmission of high tones—and this nerve trunk would appear to be the more vulnerable of the two trunks—and another part concerned with the transmission of low tones the lesser of the two is vulnerable by the latter is affected only after the high tone branch has been affected but never alone or first. The case recorded by the author proves the validity of this assumption and in addition throws valuable light on the theory that the lesion involving the cochlear nerve with its branches is never primary but secondary to vascular occlusion. The apparent vulnerability of any part of the nerve becomes easily explained on the basis of the blood supply to that nerve e.g. occlusion leads to loss of nerve function in the circumscribed part supplied by that vessel.

Early and complete restoration of the blood supply whether by recanalization of the occluded vessel or establishment of a collateral circulation will lead to an early recovery in the nerve function. The vessel may be occluded by spasm an embolus thrombophlebitis obliterans or permanent occlusion of the vessel. Realization of a primary vascular lesion producing a secondary nerve paralysis opens up a vista of explanations of common and frequent nerve lesions. A Bell's palsy may well be due to a spasm of the artery to the facial nerve or to a localized thrombophlebitis producing a paralytic lesion of the facial nerve recovery ensuing with the opening of the artery or in the case of a vein with the establishment of a collateral circulation.

A case is recorded in which only a special branch of the facial nerve was paralyzed (the patient could not blink with the eyelid) as a result of operative trauma. This was due to damage and occlusion of a minute end artery to a part of the nerve. As the blood supply became restored the function of the nerve recovered. Here again is a possible explanation of the delayed postoperative facial paralysis after the radical mastoid operation. It is the blood supply to the facial nerve that has been interfered with there has been no actual damage to the nerve itself. The satisfactory recovery of a facial paralysis after a decompression of the facial canal may be explained on the basis of permitting an early and effective collateral circulation to combat the effect of a previously occluded vessel.

Herpes zoster oticus may be explained on the basis of vascular occlusion which is temporary and rarely but may become permanent. When a end artery is blocked complete and permanent paralysis will result when another part of the vascular chain is occluded a temporary and circumscribed paralysis results. On the vascular theory of nerve deafness

(and nerve paralysis) apparent anomalies can be simply explained. The persistent noise of an airplane propeller (a low pitched sound) will produce a nerve deafness manifested by a loss of high tones. This deafness temporary and transient at first may persist if prolonged exposure to the noise continues. Larsen investigated the effect of noise on unprotected ears among boiler makers and other workers in noisy occupations also proved that a low tone noise resulted in the loss of high tones. This phenomenon is explained as follows.

Any noise above a certain intensity is a stimulus which reacts through the ear and produces a spasm of an end artery distributed to that part of the high tone division of the cochlear nerve which transmits the frequencies 4096. With the persistent exposure to the stimulus the remaining part of the vessel to the high tone division of the cochlear nerve is occluded by spasm. Removal of the stimulus leads to opening of the vessel and restoration of the nerve function and the deafness disappears. Continuous exposure to the stimulus leads to permanent occlusion of the end artery to the high tone division with the resultant permanent nerve deafness of the high tone type. Clinical observations would lead one to infer that the longest arterial branch (end artery in type and of the smallest caliber) is distributed to the high tone division and the actual termination of this end artery must be at the part of the high tone branch concerned with the transmission of the frequency 4096 double vibraton. Hence this frequency is first affected.

NO H D F B E C A N T M D

Matis E I. Practical Point in Transcortical Radical Mastoidotomy. *American Journal of Otolaryngology* 94 33 77

In recent times there has been a tendency to modify the technique of the radical mastoid operation. Improvement being aimed chiefly at the restoration of the physiological function of the ear. The endaural approach is one of the means used in order to reach the goal but it is not generally used by otologists because of its technical difficulties.

By using special technique it is possible to facilitate considerably and to simplify the endaural operation so that in many respects it does not differ from the transmastoid operation. This technique is based on the following points:

1. A wide initial incision.
2. A wide subperiosteal elevation of the soft tissue of the auricle and external auditory meatus followed by extensive laying bare of the bone making it possible to use the mobility of the plasticity of the auricle and external auditory meatus in the most ideal process.

3. The use of self holding retractors.
4. A wide removal of the mastoidectomy.
5. Special technique of removal of the bone.
6. A progressive widening of the operative field in the shortest and most direct way (most direct entrance and exit).

7 Careful attention to the tympanic membrane and ossicles

The operation is performed under local anesthesia, with procaine hydrochloride and epinephrin. The initial incision is a wide one made in a semicircle through the cavity of the concha and is at least from 2 to 2.5 cm long. This affords ample exposure of the mastoid cortex after elevation of the periosteum. The antrum is approached in the usual manner and the bridge is removed with a sharp chisel. After the cavity is cleansed the flap is cut free from the external meatus and adapted to the form and extension of the cavity on which the operation is being done. It is held in place by packed gauze. The post-operative treatment consists of changing the gauze every other day and applying other suitable means as the occasion arises.

In order to improve the functional results in the ear and to hasten healing, the transmeatal radical mastoidectomy was proposed by some. This method, however, was often technically difficult, especially because of monocular vision. The author suggests for this purpose the so called transconchal subperiosteal radical mastoidectomy. This can be done under binocular vision and is not difficult technically. Performed with the region under local anesthesia, the procedure is as follows:

After the incision has been made through the cavity of the concha, the soft tissue and the auricle are widely elevated, a self-retaining retractor is inserted and the mastoid cortex is removed. The mastoid process is chiseled from the outside to the inside, and the antrum is exposed. Then a probe is introduced, the posterior wall of the auditory meatus is removed, and a plastic flap is formed. The ossicles and the tympanic membrane are left intact as far as possible.

The results in the 137 cases in which the operation was done were satisfactory, complications occurred in only 2. Technically the operation gave rise to no difficulties.

JOHN T. DELPH, M.D.

MOUTH

Ferrandu, S. Allergic Factors in the Etiology and Symptomatology of Acute Abscess of the Tongue. Review of the Subject with Description of 3 Clinical Cases. (Fattori allergici nella genesi e sintomatologia dell' ascesso linguale acuto rivista sintetica con tre casi clinici) *Clin. chir.*, 1940, 16: 575.

Abscess of the tongue is a deep interstitial suppuration, quite distinct from stomatitis, which is a supuration affecting only the mucosa and submucosa, and from deep edema of the tongue.

True deep abscess of the tongue is very rare. Aboulker, in 1932, could collect only 43 cases from the literature. These cases are discussed and a bibliography of the literature relating to them is given. The author then describes 3 cases of his own which occurred in men of forty, forty-four, and thirty-five years of age. The disease is most frequently seen in adult males.

The tissues of the digestive tract in general, and particularly those of the tongue, appear normally to have a special resistance to bacterial infection, which probably accounts for the rarity of this disease. However, Zironi among others believes that there is a constitutional allergic factor in the cases in which abscess of the tongue occurs which, in association with lowering of the pH of the blood and tissues, makes the tissues unusually sensitive to bacterial antigens so that abscesses are produced by infections which would not produce abscesses in normal, non-allergic individuals. In support of this theory the author cites the constitutional allergic factors in the histories of his 3 patients, such as urticaria, Quincke's edema, and intermittent hydrops of the joints.

ALDRIN G. MORGAN, M.D.

PHARYNX

Fischer, J., and Gottdenker, F. Transient Bacteriemia Following Tonsillectomy. Experimental Bacteriological and Clinical Studies. *Laryngoscope*, 1941, 51: 271.

In 30 per cent of the cases, tonsillectomy is followed by a transient invasion of bacteria into the blood. The climax of the invasion may be observed two hours postoperatively, and within twelve to twenty-four hours the blood is entirely sterile. The incidence of bacteriemia is noticeably increased with coarse dissection, with contusions, and with lacerations of the surrounding tonsillar tissue, also, whenever local manipulations like ligation or tamponade are necessary. The transient bacteriemia should, under no condition, be confused with a clinical picture of septicemia or septicopyemia. The transient bacteriemia after tonsillectomy has no great clinical significance. In the majority of cases it disappears without having given symptoms. Only in exceptional cases of predisposition, viz., in the presence of lowered body resistance, may one observe exacerbation of an old latent process following the invasion of bacteria into the blood.

The practical consequences concluded by the authors from these bacteriological and clinical studies are:

1. Operative procedure should, if possible, avoid unnecessary coarse tearing or manipulation of the tissues.

2. The time of performing a tonsillectomy should be chosen with care. It should not be attempted too soon after the last attack of inflammation.

3. The operation should be avoided in patients with markedly lowered resistance of the entire body.

NOAH D. FABRICANT, M.D.

NECK

Wulff, H. B. The Treatment of Tuberculous Cervical Lymphoma, Late Results in 230 Cases Treated Partially Surgically, Partially Radiologically. *Acta chirurg. Scand.*, 1941, 84: 343.

The author investigated the late results in a series of 230 cases of tuberculous cervical lymphoma

treated in the Surgical and Radiological Departments of Lund Hospital between 1928 and 1932 inclusive. This series however comprises only about 50 per cent of the total material for the corresponding years since the remainder of the patients failed to report for the requested check up examination. Surgery was employed in 105 cases and radiation therapy in 125.

The diagnosis was confirmed by histopathological examination in practically 100 per cent of the surgically treated cases and in about 20 per cent of the irradiated cases. No typing of the human or bovine tubercle bacilli was made as yet at that time.

The treatment in both departments was during the entire period along more or less uniform lines. The surgical therapy consisted in the great majority of instances of the most radical possible extirpation of the lymph nodes. In 30 per cent representing many cases with liquefaction, curettage with a sharp spoon was done followed by the insertion of a thin rubber tube or iodoform tampon for two or three days for drainage. The radiation therapy was carried out with 150 to 180 kv. 4 mm. of aluminum filter or in a few cases 4 mm. of copper and 1 mm. of aluminum filter 3 to 6 m.a. 30 to 40 cm. skin target distance from 7 by 7 cm. to 10 by 10 cm. field and a dose which on the surface of the skin varied between 80 and 130 roentgens or the corresponding part of 1 SUD. The interval between the individual treatments was as a rule one month or occasionally two or three weeks and the total number of treatments ranged from 3 to 23. Often minor surgical interventions such as incision, punctures or scrapings supplemented the irradiation.

In the analysis of the results the cases were classified into 3 groups. Group I contained the cases in which a simple frequently solitary tuberculous lymphoma without demonstrable peradenitis or liquefaction was present. Group II was made up of the cases in which the tuberculous process formed larger or smaller packets of nodes with evident peradenitis and liquefaction but without spontaneous fistulas or scrofuloderma. Group III was made up of the cases in which the tuberculous process led to fistulas or scrofuloderma.

The final results are shown in the following table.

Method	Group	N	Healed		Improved		Relapses		Deaths		Percentage
			P	N	P	N	P	N	P	N	
Surgery	I	80	80	4	3	1	4	23.8			
	II	56	8	3	4	3	9	6	0.7		
	III	64	5	4	5	3	8	0.5			
	Total	200	82	78	6	5	7	14	3	3	9 (0.5 Case)
Irradiation	I	38	3	6	2	2	5	0			8
	II	57	60	0	3	6	14	5	3	1	76.0
	III	0	7	4	2	14	3	2	4	3	
	Total	80	64	0	6	8	29	2	4	8	(5 Cases)

As is noted simple solitary lymphomas (Group I) responded equally well to surgical and roentgenologic

ical treatment. Lymphomas with peradenitis and liquefaction (Group II) reacted more favorably to surgical treatment and lymphomas with fistulas and scrofuloderma (Group III) responded best to roentgenologic treatment. T. LUTCHFIELD

Pressman J. J. Sphincter Action of the Larynx Arch Otolaryngol 1934 33 35

The larynx has developed not primarily as a sound producing organ but rather as a sphincter valve to isolate the upper from the lower respiratory passages. It first appeared as a circular muscle band in the lungfish to prevent sea water from invading the lungs. A cartilaginous supporting framework made its appearance in reptiles to permit the maintenance of a patent lumen despite the prolonged presence in the adjacent esophagus of a huge bolus of food. This framework has been retained throughout the evolutionary cycle. The muscular sphincter came to lie as a horizontal band within the lumen of the cartilaginous structure and ultimately in certain mammals such as man became separated by a fissure into lower and upper divisions, the true and the false vocal cords.

The latter constitute the principal element of the sphincter girdle. They are composed for the most part of striped muscle tissue which effaces the mass of the superior division of the thyroarytenoid muscle. Some of the fibers of the superior division pass laterally around the arytenoids to join the interarytenoid muscle and likewise fibers of the inferior arytenoids pass anteriorly into the false cord.

This arrangement forms the arytenoid sling which constitutes an important muscular element in the formation of the sphincter girdle. Its closure is accompanied by a foreshortening of the length of the interior of the larynx by a shifting forward of the cricoid cartilage and the arytenoid and a shifting backward of the thyroid. The details of the muscular action that makes this closure possible are described by Pressman. The true vocal cord is composed essentially of the inferior division of the thyroarytenoid muscles and these play a minor rôle in the sphincter action.

Closure of the sphincter mechanism consists of a tight approximation first of the true and then of the false cords, the posterior dehiscence being filled by the mass of the arytenoids which tilt forward. Release of the sphincter is accompanied by a purposeless waving motion especially of the true cords. A second sphincter composed laterally of aryepiglottic folds posteriorly by the mass of the arytenoids and anteriorly by the epiglottis is described. It is pointed out that the phincter mechanism is controlled not only by the recurrent laryngeal but in some small degree by the superior laryngeal nerve.

The purposes of the sphincter mechanism are to close off the entrance into the lower respiratory tract during swallow and thereby prevent invasion of this tract by food tufts from above.

To permit thoracic fixation on by trapping air within the thorax and by preventing the entrance of

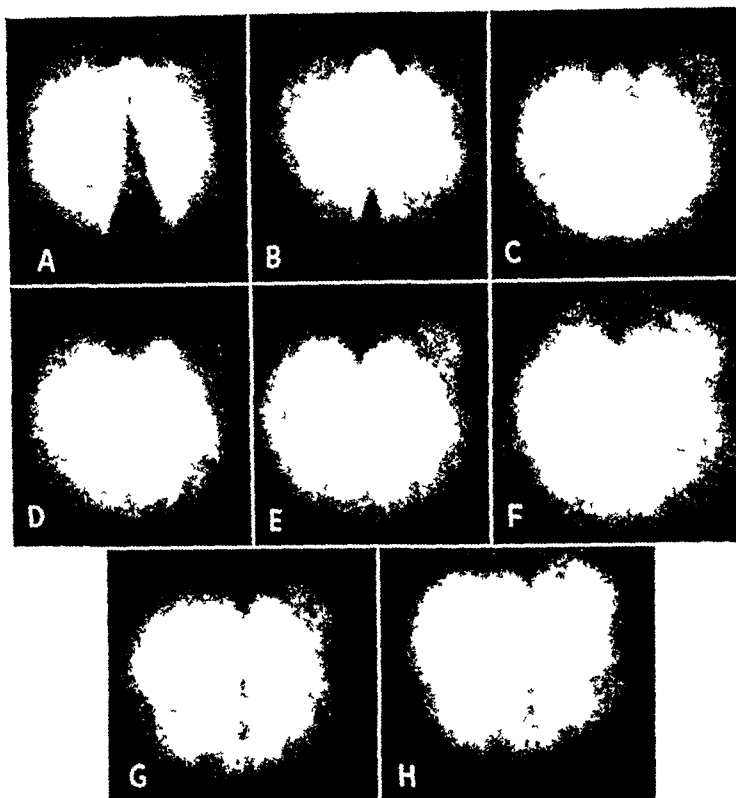


Fig 1 Photographs demonstrating successive steps in the closure of the false cord sphincter valve. A, preliminary stage the false and the true cords are abducted in position of rest. B, beginning of closure the true cords are almost closed, the false cords are still widely open. C and D, closure of the false cords begins the anterior portions of the false cords begin to approximate, and there is also closure of their posterior extremities, which leaves an oval hiatus. Note the complete closure of the true cords. E, anterior segment of false cords completely closed. F and G, continued closure of the false cords progressing from anterior to posterior. H, final stage the false-cord sphincter is tightly closed, and completely hides the underlying true cords.

additional quantities from above. This has far-reaching effects in the use of the pectoral girdle and in the establishment of increased intra-abdominal pressure.

3 To permit the momentary accumulation of increased intratracheobronchial pressure before the expulsive effort in cough.

NOAH D. FABRICANT, M.D.

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS CRANIAL NERVES

Monnier M. The Functions of the Pineal Gland
(L'importance de la glande pinéale) *Rev méd de la Suisse* 1934 p 178

On the basis of various theoretical reasons alone Monnier believes that the pineal gland, an organ of internal secretion. He points out however that the literature on the subject of the pineal gland is characterized by the lack of agreement among physiologists as to the functional significance of the gland and that two distinct groups—those who believe it is a vestigial structure and those who hold it to be a functioning organ in its own right—have grown up as a result of experimental observations which have been at complete odds.

From his own experiments on rats (gland implantation, gland feeding and extract administration) as well as from a review of what he holds to be reliable reports from others, the author believes that the pineal gland exerts a repressing effect on the sexual maturation of both sexes affecting both primary and secondary sexual characteristics. Pinelectomy in plantations and extract administration experiments seem to establish this as factual. The effect of the pineal gland on somatic development is somewhat less certain; there may be an inhibitory action of the pineal gland on somatic development. Pineal extracts apparently have a hypotensive action which he finds to be much like that of histamine and they are antagonistic to the action of pituitrine and adrenaline. As shown by the retraction of melanophores in tadpoles, there is some opposing effect of pineal extract on the intermediate lobe of the hypophysis and the author adds that the habenulo-epiphyseal system has an opposing effect on the action of the hypothalamohypophyseal system. He believes that certain reports concerning the rôle of the pineal gland in cerebrospinal fluid secretion and the metabolism of the glucides need further affirmation by more experimental work.

JOHN MARTIN M.D.

Pratt M. Clinico-statistical Report on 51 Patients with Craniocerebral Wounds—Spanish War 1936-1939 (Rilei et al. co-stat. to su. 5. fruita) *Cerebral—gué d'Espagne* 1936-1939 (L'Année 1940 16 809)

Among 5140 wounded in ten months of service the author saw 219 cranial wounds of which 170 involved the soft tissues of the cranium and 52 were craniocerebral wounds. Thus 4 per cent of all the wounded had craniocerebral wounds.

The author finds that wounds of the pericranium supported very readily. For this reason the scalp should be shaved immediately, the wound washed with hot physiological saline solution, the necrotic

tissues excised and foreign bodies removed as rapidly as possible. Careful examination is necessary in these cases to rule out deep craniocerebral injuries. X-ray examination is a necessity. The pericranial wound when treated as above with the aid of sulfonamide drugs when necessary gave good results and there was no mortality in these cases.

The author then presents brief clinical summaries of 51 deep craniocerebral wounds which he treated. The patients were transported directly to the hospital as soon as possible after being wounded. Not all of the patients had mental, psychic sensory or motor sensory symptoms. Some had cerebral prolapse or presented bone particles imbedded in the brain without any symptoms of localization. In 30 cases pieces of bone were found imbedded in the cerebrum in 9 cases there were projectiles or metallic particles. Prolapse of the cerebrum was observed in 14 of 51 cases. Cerebral abscess was observed in 5 patients of this series and meningo-encephalitis caused the death of 6. When bacteriological studies could be done the streptococcus was found to be the chief offender.

The prognosis in craniocerebral wounds is serious both as to life and recovery of function. In the author's series there was a mortality of 16 per cent. Among the recovered patients there were various degrees of disturbed function. Cerebral prolapse is a serious complication on which in most cases indicate the presence of cerebral inflammation. Craniotomy is a serious procedure which should be done only after due deliberation in each case for definite indications such as removal of the destroyed cerebral tissue, ligation of the blood vessels, removal of foreign bodies, removal of hematomas, incision and draining of abscesses and removal of adhesions and pressure from meningo-encephalic masses of tissue. In those patients with localized symptoms such as hemiplegia, monoplegia, epileptic symptoms and cranial nerve injuries, the need for intervention is not so acute and the time for intervention may be chosen when the patient's general condition has been improved.

The author then briefly discusses his technique. He prefers anethesia with 0.5 per cent novocaine with the addition of adrenaline. For incision of the pericranial tissues he prefers a T incision or a linear incision to a usual semicircular flap. He finds that prolapse of the cerebrum is due more to inflammation of the brain and meninges rather than to the size of the aperture in the cranium. A large opening in the cranium is usually unaccompanied by cerebral edema or reaction in contrast associated with cerebral prolapse. If the dura mater is intact the author does not open it since this would aggravate the prognosis in trepanning patients. Whenever possible the author tries to extract projectiles and foreign bodies through the existing track of the foreign object if

there is risk of deep injury to the brain with this procedure he does not continue. In most cases cerebral prolapse is a defense measure of the body and should be treated cautiously and conservatively. In 10 cases of meningo-encephalitis all treatment was futile.

JACOB E. KLIN, M.D.

Cammermeyer, J. A Neuro-Anatomical Study of the Brain After Ligation of the Carotid in a Case of Traumatic Pulsating Exophthalmos (Eine neuroanatomische Untersuchung des Gehirns nach Unterbindung der Carotis in einem Fall von traumatischem pulsierendem Exophthalmus) *Word Med*, 1940, p. 1283.

Fatal cases in connection with a pulsating exophthalmos are comparatively rare even though intervention is a severe procedure. All methods of treatment are based on excluding a large vascular segment from function. In ligating the carotid artery in the neck one must reckon with the following important complications: a defective blood supply to the brain as a result of occlusion of the brain vessels, thrombosis in the involved vascular segments with the danger of embolism, circulatory disturbances in the central nervous system caused by the disturbances of consciousness, and also air embolism in the field of operation. In a case of carotid ligation for traumatic pulsating exophthalmos with a fatal outcome eighteen hours postoperatively, the author made the following neuro-anatomical observations.

Complete localized destruction in the frontal and parietal regions with involvement of the motor area and the neighboring convolutions. The nerve cells showed changes of varying degrees which were characteristic of the so called "ischemic homogenization" of Spielmeyer and of the severe nerve damage described by Nissl. The glia cells showed regressive changes with pyknosis and karyorrhexis. The mesenchyma appeared to be less severely affected. The marginal necrosis corresponded to the extent of supply of the end arteries from the middle cerebral artery and probably was a result of embolism.

(HAAGEN) JOHN L. LINDQUIST, M.D.

Morson, S. M. The Diagnosis of Cerebellar Disease *Med J Australia*, 1941, 1: 172.

This article primarily deals with the subject of differentiation of cerebellar tumor from other, possibly non-surgical, diseases of the contents of the posterior cranial fossa.

Tumor of the cerebellum manifests itself early by signs of increased intracranial tension, headache being the most common early result of such an increase of pressure. Projectile vomiting, changes in visual acuity and movements of the extra-ocular muscles, opisthotonic cerebellar fits, hydrocephalus, and papilledema are common symptoms, especially in children, in whom they occur early. Lumbar puncture will reveal increased spinal-fluid pressure, and roentgenological evidence of a posterior fossa tumor, such as suture separation, digital markings, and ballooning of the sella turcica, must be taken

into account. Likewise, thinning and bulging of the suboccipital bone is frequently to be noted.

Intracerebellar lesions such as toxic hydrocephalus, basilar arachnoiditis, lead encephalopathy, tumors of the third ventricle, and pineal tumors may all simulate cerebellar tumor to a marked degree.

JOHN MARTIN, M.D.

Phillips, G. The Surgery of Intracerebellar Disease *Med J Australia*, 1941, 1: 176.

The two principal surgical lesions of the cerebellum are tumors (common intracranial tumors of children) and abscesses (rare at any age). The author believes that tumor of the vermis or midline has such definitive localizing signs that when such signs are seen immediate operation is required. Tumors suspected elsewhere in the posterior fossa may require ventriculography, since the lesion may turn out to be in the cerebrum. Grave consequences may arise from the opening of the posterior fossa in the presence of a supratentorial tumor.

In the typical case the author makes a midline nuchal incision and removes enough bone to allow inspection of the midline structures and needling of the hemispheres. If a tumor of the hemisphere is found, a unilateral suboccipital muscle flap is reflected to give better exposure. The author always taps the posterior horn of the lateral ventricle before opening the dura of the cerebellum.

He follows a conservative attitude toward the treatment of cerebellar abscess, and he believes that aspiration, continuous drainage, or marsupialization may be used as indicated. The folly of attacking an abscess before a glial wall is formed about it is emphasized.

JOHN MARTIN, M.D.

Horrax, G. Favorable Types of Brain Tumor and the Results of Their Operative Removal *England J Med*, 1941, 224: 307.

It is true that reports on the end-results in patients who have been operated on for brain tumor are few, and in the past most of these reports have been made by Cushing about his own patients or by Cushing's pupils about Cushing's patients.

The substance of the present report concerns 400 consecutive cases of brain tumor seen by the author between 1932 and 1939. Of these, 224, or 56 per cent, were "favorable" tumors. Horrax makes it clear that although the tumors were "favorable" from the academic standpoint, from a practical standpoint there were technical and other difficulties which led to their incomplete removal. In this series of 224 tumors, there were 27 postoperative deaths, a mortality of 12 per cent. Of the 197 survivors, 10 subsequently died, leaving a final 187 patients who had harbored favorable types of brain tumors which were believed to have been completely removed. The types of tumor were meningiomas, 80, acoustic neuromas, 33, pituitary adenomas, 30, gliomas (mostly cystic), 29, miscellaneous, 52.

Of especial interest is the description of the complete eradication of the acoustic neuromas. The

inevitable facial paralysis which follows the removal of these tumors can be largely overcome by a subsequent sphenofacial anastomosis. Of the 187 survivors of the 224 patients with favorable brain tumors 27 have disabilities which leaves a total of 160 patients or 71 per cent who have survived and are leading useful lives.

ADRIEN VERBRUGGEN M.D.

Laudig C H Browder E J and Watson R A
Subdural Hematoma *A S J* 941 3 170

The causes of subdural hematoma are many. Trauma is probably the most frequent cause but metastatic tumors, cerebral abscess, ruptured cerebral aneurysms and Virchow's hemorrhagic infarct must all be listed as possible factors in such bleeding. The bleeding is by no means always arterial in origin for laceration of dural sinuses or cortical vessels is known to be a frequent source of subdural blood clots. Seventy-five per cent of such clots seen by the authors originated from laceration and/or contusion of the surface of the brain implicating cortical blood vessel.

It is pointed out that hematomas which have been present for several weeks or months may be dis-

tinguished from neoplasms only with great difficulty. If there is any question of doubt especially if there is a history of head injury, biparietal burr holes should be made to see directly whether or not a clot exists. Roentgen ray studies are valuable in searching for a mild perineal shift and in pneumoencephalography.

The one and only treatment for such a lesion is surgical—the removal of the clot. If the clot is still solid (subacute) it must be removed by turning down a small osteoplastic flap; if it is acute or chronic it may be in a liquid state and it can then usually be irrigated out through burr holes by copious saline irrigation. In any event, absolute hemostasis of any exposed dura, cortex or hematoma membrane is essential. The authors recommend in general the conservative care of all craniocerebral injuries and if feasible the postponement of operation until the acute effects of the injury have moderated.

This report is based on a study of 143 cases of actual clot formation and instances of small films of blood on the cortex or of more or less diffuse subarachnoidal hemorrhage have been excluded.

JOE MARTI M.D.

SURGERY OF THE THORAX

TRACHEA, LUNGS, AND PLEURA

Blancetana, I. Theropods with Extrafacial
Apiculate (L. 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832. 833. 834. 835. 836.

[illegible]

The incision extends to steps to select a certain number of the upper ribs, 5 or at the most the single stage operation, and apical and apical. Local and regional are then used to select cases. The incision begins about 2 cm. from the middle above the spine of the scapula, runs down between the vertebral column and the vertebral border of the scapula, describes an arch curve toward the lower angle of the latter, and then runs out and. All the ribs involved in the thoracoplasty are disarticulated at their costal, vertebral joint and the first 2 are also disarticulated at the sternum. The other ribs are resected to a decreasing extent, beginning with the third. As much as possible, the apical costal tuberculum a complete collapse of the entire upper lobe both in the transverse and vertical directions. If it is found necessary to extend the intervention, this must be done in a second stage as soon as possible after the first, with peridural anesthesia and the same incision, 2 or 3 more ribs are resected, again at a decreasing rate, and the apical is must be per-

THE UNIVERSITY OF CHICAGO

Gallone, I. The Involvement of the Mediastinal Lymph Channels in Secondary Carcinoma of the Lung

It is evident that the study of the lymphatic system is a part of the large collecting vessel of the lymphatic system, the secondary system, and of the lymphatic system as a whole. The lymphatic system is divided by the lymphatic system into the lymphatic system and the lymphatic system. However, an exception is made for cancer of the breast which may spread directly into the lymphatic system through the lymphatic system and the lymphatic system, and from there, spread to the lymphatic system of the lymphatic system and the lymphatic system. On the other hand, cancer of the breast may, in fact, spread directly to the lymphatic system of the lymphatic system and the lymphatic system. This is excluded by the study of normal and pathological anatomy which demonstrates the presence of direct communication between the anterior mediastinal and the tracheobronchial lymphatic chains. Under normal conditions, the lymph travels from the tracheobronchial to the anterior mediastinal nodes, but this argument is insufficient to deny the possibility of a retrograde propagation of carcinoma because the neoplastic processes do not respect the direction of the lymphatic current.

Bronchial cancer may for obvious reasons directly invade the lymphatic network of the lung in which it is originated, in this case, also, the early involvement of the trichobronchial lymph nodes is the best

condition to favor subsequent retrograde propagation to the entire lymphatic network of both lungs. In fact when the tracheobronchial chains are invaded and the neoplastic process reaches the opposite hilus by the retrograde route the necessary condition is established for the reproduction of the same picture of lymphatic carcinoma of the other lung.

The study of lymphatic carcinomatosis of the lungs caused by abdominal tumors presents a special interest. In these cases the most frequent point of origin is located in the stomach. The route of the thoracic duct does not allow understanding in what manner a cancer originating in an abdominal organ can reach the tracheobronchial lymph nodes and from them invade the lymphatic network of the lungs. In addition the rather extensive involvement of the anterior mediastinal and tracheobronchial chains found in cases of secondary lymphatic carcinoma of the lungs cannot be reconciled with an exclusive propagation through the intermediary of the thoracic duct. Therefore it is necessary to take into special consideration two routes which differ from that of the thoracic duct and which constitute direct tracts of metastatic propagation between the tracheobronchial mediastinal and abdominal chains. The first of the two routes is provided by the communications existing between the tracheobronchial and the posterior mediastinal (peri esophageal) lymph nodes through which the metastases of abdominal origin arrive rather early and those of gastric origin with the greatest frequency. The second route is provided by the direct connections existing between the tracheobronchial lymph nodes by means of lymphatics located in the pulmonary ligaments and the supradiaphragmatic lymph nodes which in turn may be invaded early and directly by metastases when the point of origin is located in one of the organs contained in the upper part of the abdominal cavity.

RICHARD KRIEGL, M.D.

Pratt M. A Clinical and Statistical Report on 193 Wounds of the Pleura and Lung (Rui vicl o t t t u a 93 i n t i p l o p o l m n) P I I R m 94 47 p r a t 28

The author reports the cases observed in the Ninth Legionary Hospital for the ten months from January to November 1938. The patients were Italian and Spanish legionaries. There were 199 admissions, 510 of them for war wounds. Among these 400 were injuries of the chest but only 193 that is to say 37 per cent of all the wounds were penetrating wounds of the thoracic cavity with injury of the lungs or pleura.

The data of the hospital from the front was from 5 to 300 kilometers depending on the movement of the troops. This was traversed in automobiles or hospital trains. The time between the injury and admission was in most of the cases from one to five days. Only 17 patients were admitted as late as from two to seven months after the wound and they were suffering from the sequelae of pleural

or pulmonary injuries. The stay in the hospital was from one to forty eight days. The patients were evacuated as soon as possible to make way for others but not until they were on the way to recovery and it was safe for them to make a long journey by hospital train.

The chief symptoms were hemorrhage in the thorax hemoptysis generally moderate as the patients with very severe hemoptyses had doubtless died of the fatal subcutaneous emphysema retention of projectiles closed or open pneumothorax and concomitant injuries of other parts of the body. There were few complications viz bronchopneumonia, 4 cases abscess of the lung in 1 emphysema in 1 and phlebitis of the subclavian vein in 2.

Contrary to the practice in the last war the author does not believe in active surgical intervention in the majority of cases. His treatment in most cases was limited to rest in bed in a semi sitting position the use of opiates when necessary the emptying of blood from the thorax and substitution of the same or a somewhat larger amount of air the transformation of open into closed pneumothorax a drainage of the pleura in cases of emphysema with a tendency to widespread diffusion. If there was only a small amount of blood in the thorax it was not emptied but allowed to be absorbed. In consideration of the fact that there was only 1 death among these 193 cases and this in a case complicated by paraplegia from injuries of the spine the author believes that this method of treating war injuries of the lung is justified.

AUDREY G. MORCA, M.D.

Hochberg L. A. A Study of 300 Cases of Acute Empyema Thoracis (132 Streptococci and 168 Pneumococci) J Thor & S 194 0 354

This author reports on a series of cases which had all been subjected to preoperative diagnostic thoracentesis and on the bacteriological and cytological studies of the fluid thus obtained. The criterion for the diagnosis of empyema was the presence of frank pus in the pleural cavity. The criteria for empyema were (1) an afebrile state (2) minimal drainage (3) complete expansion of the lung and (4) roentgenographic evidence of complete expansion of the lung without retention of pleural fluid. Conversely these cases were considered surgical failures in which (1) there was a febrile course (2) drainage persisted (3) the lung was incompletely expanded (4) the roentgenograms showed retained fluid and (5) the patient required more than twenty days of postoperative hospitalization.

Streptococcal empyema was present in 132 cases of which 8 failed to respond to surgical drainage. Thirteen cases of streptococcal empyema were treated bypiration but these were uncomplicated and 21 were complicated. In addition there were 10 cases which failed to respond to aspiration and later required an thoracotomy drainage. There were 4 deaths among the uncomplicated cases and 2 deaths among the complicated cases. The complications consisted of bronchial pneumonia with and

without empyema, peritonitis, pericarditis, lung abscess, gangrenous bronchitis, brain abscess, erysipelas, pleurobronchial fistula, and empyema necessitatis. Thirty-five cases treated by closed intercostal drainage were made up of 27 uncomplicated cases and 8 complicated cases with 5 and 7 deaths, respectively. There were 4 uncomplicated cases of empyema which failed to respond to this form of drainage. The mortality in the uncomplicated cases was 16 per cent and in the complicated cases 70 per cent. The complications resulting in death consisted of ruptured lung abscess and pleurobronchial fistula, bilateral pneumonia and empyema, pericarditis and pneumonia, pleurobronchial fistula, pericarditis and pneumonia, and bronchopneumonia and lung abscess. There were 58 cases of streptococcic empyema treated by rib-resection drainage. Forty-three of these were uncomplicated and 15 were complicated. Of these, 5 uncomplicated cases and 3 complicated cases were surgical failures. The mortality in the uncomplicated cases was 4 per cent and in the complicated cases 33 per cent. The deaths were due to lung abscess, bronchial pneumonia, pericarditis, empyema necessitatis, spontaneous pneumothorax, and ruptured peripheral lung abscess. It is therefore clear that the mortality in the complicated cases of streptococcic empyema was more than five times as great as the mortality which occurred in the uncomplicated cases.

The author then reviews 168 cases of pneumococcic empyema of which 7 were surgical failures. Twenty-four cases were treated by aspiration. Eight of these were uncomplicated cases with 3 deaths, and 16 were complicated cases with 15 deaths. The complications consisted of bronchial pneumonia, contralateral bronchopneumonia, pericarditis, lung abscess, cellulitis of the chest wall, bronchopleural fistula with lung abscess, and fistula without lung abscess. Twenty-nine cases were treated with closed intercostal drainage, 27 of these were uncomplicated and 2 were complicated. In addition, there were 22 cases which later required rib-resection drainage, 16 of these were uncomplicated and 6 were complicated. Among the uncomplicated cases there were 2 deaths and among the complicated there was 1 death. One hundred and eight cases were treated by rib-resection drainage, 21 of which were complicated and 87 uncomplicated. There was 1 death among the uncomplicated cases and 9 deaths among the complicated cases. In addition there were 7 which failed to respond satisfactorily to this method of drainage. Four were uncomplicated and 3 were complicated. These complications consisted of pleurobronchial fistula, bilateral bronchopneumonia, lung abscess, pericarditis, suppurative mediastinitis, bilateral empyema, empyema necessitatis, and peritonitis. The mortality in these cases of pneumococcic empyema is related to the incidence of complicated cases and not to the incidence of empyema itself. The best method to be employed in drainage of uncomplicated pneumococcic empyemas is rib resection.

J. DANIEL WILLEMS, M.D.

ESOPHAGUS AND MEDIASTINUM

Heuer, G. J. *Surgical Treatment of Tumors of the Mediastinum*. *Ann. Surg.*, 1941, 113: 337.

In a series of 107 cases of malignant disease of the mediastinum, which included Hodgkin's disease, lymphosarcoma, and primary and secondary carcinoma and sarcoma, only 15 (14 per cent) could be considered as suitable for surgical treatment. However, if the primary malignant tumors only are considered, surgery appeared possible in 15 of the 17 cases observed and was undertaken in 12. In one-half of these cases it was possible to remove the tumor. The experience suggests that with earlier diagnosis and earlier surgical intervention a greater number of the primary malignant tumors of the mediastinum may come within the field of surgery.

Of a series of 30 cases of proved or presumed benign tumors of the mediastinum, only 17 or 43 per cent were treated by a surgical operation. In 16 of the 17 patients the tumor was removed, and of the 13 who survived operation, 12 are at present well. In view of the surgical results obtained, it is the author's opinion that a larger percentage of the benign, or presumably benign, tumors should be subjected to operation.

It has been the author's experience that the dermoid cysts and non-malignant teratomas, the various other mediastinal cysts, the intrathoracic goiters, the benign connective-tissue tumors (including those derived from cartilage), the benign tumors of neurogenic origin, the benign tumors of the thymus, and some of the sarcomas lend themselves to surgical removal, while the primary malignant tumors of the mediastinal lymph nodes (lymphosarcoma, Hodgkin's disease), the malignant teratomas, the malignant thymomas, and the various other mediastinal carcinomas have proved unsatisfactory from the viewpoint of surgery. While a number of such cases have been subjected to surgery, exploration has always shown an extent of the disease beyond the possibilities of surgical eradication. Roentgenotherapy in these has served to relieve the symptoms and prolong life, particularly in patients with Hodgkin's disease and lymphosarcoma.

After trying various methods, the author has found the intratracheal method of anesthesia uniformly the most satisfactory. It relieves the surgeon of the fear of open pneumothorax, it permits even the wide opening of both pleural cavities if this becomes necessary during the course of the removal of the tumor. Ether and oxygen were found to be very satisfactory, also nitrous oxide-oxygen combined with ether. Most satisfactory of all is cyclopropane administered through an intratracheal tube, and this has recently been the anesthetic of choice.

The location of the mediastinal tumor determines the thoracic approach. Generally speaking, three operative approaches will be applicable in the majority of lesions. The small to moderately large anterior mediastinal tumors may be approached by an anterior T-shaped incision, the vertical leg of the T

being placed parallel with and over an appropriate rib and the horizontal leg of the T parallel with and over the lateral border of the sternum. A single rib with its costal cartilage is resected subperiosteally. The costal cartilage immediately above and below is divided at its sternal junction. With the pleura opened and a rib separator properly placed a large triangular opening is secured, the base at the sternum and the apex at the lateral thoracic wall. For the upper posterior mediastinal tumors a posterior approach along the spine with retraction of the scapula and with resection of sufficiently long segments of an appropriate number of ribs gives an exposure of the posterior mediastinum that is sufficiently large to remove all but the very large tumors. For the large tumors which have extended far into one or both pleural cavities a long incision encircling the hemithorax with or without the resection of a single rib is to be preferred.

The importance of the closure of the thoracic wound after the operation within the thorax has

been completed cannot be overemphasized. Because of physiological considerations the closure should be airtight so as to prevent the occurrence of a sucking pneumothorax and it should be secure so as to prevent subsequent reopening of the wound. If there has been no soiling during the procedure closure should be complete and without drainage. Should an effusion occur after operation this had better be treated by repeated aspirations than by primary drainage in anticipation of its occurrence. If definite soiling has taken place during the operation the thoracic wound should nevertheless be closed completely and drainage if thought necessary established by the airtight suction method at a distance from the wound.

In the immediate postoperative course the oxygen tent has been found very useful and is regularly employed. The occurrence of an effusion postoperatively is common and should be recognized early and treated as has been indicated.

JOSEPH K. NALL MD

THE BEARING OF THE GASTRIC SECRETORY MECHANISM UPON THE SURGICAL MANAGEMENT OF GASTRIC AND DUODENAL ULCER

Collective Review

FREDERICK C HILL, M D, M S in Surg, F A C S, Omaha, Nebraska

IT is generally conceded that there are factors other than secretory which are concerned in the etiology of peptic ulcer, but since these other factors are largely beyond the realm of surgery, nearly all of the operative procedures which have been used in the treatment of ulcer have been concerned with the production of a change in the gastroduodenal secretions. Even if it is true that the primary cause of peptic ulcer is "constitutional," there results from this a secretory disturbance which can often be recognized as the secondary cause. We cannot, beyond certain limits, change the patient's constitution, but we can by surgery alter the resulting secretory maladjustment. It has been said that there is no surgical treatment for ulcer, only for its complications, but in all surgical procedures performed on the stomach one must be concerned with another form of treatment—the prophylactic. With the universal recognition of the frequency of secondary ulcer, all surgeons agree that one must insure, as much as possible, that whatever operation is done will leave the patient with the minimum chance of subsequent ulceration. It is evident that a knowledge of the mechanism of gastric secretion becomes of primary importance in the intelligent choice of operative procedures. The information available concerning the mechanism of gastric secretion is, like that of any other physiological function, far from complete, but certain facts are known, and it is the purpose of this discussion to indicate them and to review briefly recent investigations which pertain to this particular subject.

The secretory activities of the stomach may be divided into three periods, all of which more or less overlap.

1 The psychic phase. This is when the secretion is brought about by the sight, taste, or smell of food, or by a conditioned reflex which has been established in association with food.

2 The gastric phase. This is when the secretion is produced by stimuli arising within the stomach.

3 The intestinal phase. This is when the flow of gastric juice is initiated by the entrance of food into the intestine.

THE PSYCHIC PHASE AND THE EFFECTS OF VAGOTOMY

Pavlov, by means of a gastric pouch, was the first to demonstrate the psychic phase of gastric secretion, and among other facts, he found that the quantity of juice secreted varied with the type of food and the appetite of the animal and that this juice was rich in pepsin. When the vagus nerves were cut he found that this phase of secretion was abolished, and he concluded that it was a reflex through the vagus nerve.

The clinical application of vagotomy as a means of reducing the acidity of the stomach has not been extensive. Schiassi (48), in 1925, reported a series of 25 cases in which he cut branches of the vagus nerve on the stomach in the treatment of duodenal ulcer with favorable results. C. H. Mayo (42), in 1928, sectioned the nerves along the lesser curvature on the anterior and posterior walls of the stomach. Hartzell (27), in experiments on dogs, cut the anterior and posterior vagal trunks above the diaphragm of some animals and in the abdomen in others. He found that when the nerves were sectioned in the thorax, there was a definite reduction in both the total and free acidity, and that the highest curve after operation was lower than the lowest pre-operative curve. When the nerves were cut in the abdomen, the acid sometimes reached the same height as before operation, but the secretory curve was shorter and the stomach emptied sooner. Vanzant (56), however, studied 4 of Hartzell's dogs, two and one-half years later, and found that the secretion at that time had become approximately the same as before operation.

Wilhelmj, McCarthy, and Hill (67) found that after partial gastrectomy and bilateral vagotomy

in dogs there was a decrease in acid secretion which was greater than that which occurred after partial gastrectomy alone. In 51 tests with a Liebig-extract test meal 33 per cent were characterized by anacidity.

Winkelstein and Berg (72) combined subphrenic section of the anterior vagus nerve with partial gastrectomy and found that these procedures produced achlorhydria in most patients.

Ferguson (18) studying the effects of vagotomy in monkey cut the nerves in the neck in 5 animals and below the diaphragm in 5 other animals. He found that the acid was not lowered in the 6 animals of which the gastric secretions were analyzed. Cardiospasm occurred in all animals and there was also delayed emptying time for solid food. In 2 monkeys there were found to be mucosal erosions 1 in the duodenum and 1 in the stomach and in 1 of these cases the ulcer perforated and caused the death of the animal.

Meek and Herrin (43) also observed gastric stasis in vagotomized dogs on solid food and in 2 instances Meek reported the development of gastric ulcer. Beazell and Ivy (4) performed bilateral subdiaphragmatic vagotomy on 30 rabbits and the incidence of ulcer in rabbits which survived longer than twenty nine days was 50 per cent. All of these ulcers were typical chronic ulcers and were located along the lesser curvature of the stomach. Sixty dogs were subjected to bilateral vagotomy above the diaphragm and kept on a soft diet. None of these were found to develop ulcer.

Meek and Herrin in their studies on bilateral vagotomy in dogs concluded that the vagus nerve is necessary for the maintenance of normal gastric tonus and that the emptying time of the stomach is in some way affected by the amount of tonus. Barron and Curtis (3) cut the left vagus nerve below the diaphragm in one patient. Preoperatively this patient had hypermotility as shown by a balloon in the stomach. After the operation the emptying time of the stomach was reduced to about three hours (four hours shorter than before operation) and it was found that the pyloric sphincter was apparently relaxed. Five months after the operation the emptying time was still decreased and the patient remained symptomatically well.

Crisler and Van Ijere (10) on the other hand found that section of the pyloric sphincter or partial parasympathetic denervation of the sphincter did not shorten the emptying time of the stomach. They believe that the normal pyloric sphincter is not of great importance in determining the emptying time of the stomach or if it is

its function is taken over quickly by some other mechanism after the sphincter has been denervated or sectioned. They do not believe that the sphincter is entirely without function but consider it simply an accessory mechanism. These authors performed their experiments on dogs and cut the vagus fibers by incising a ring around the pylorus 1 in above the sphincter.

Meschan and Quigley (44) by placing three tandem balloons in the pyloric antrum the pyloric sphincter and the duodenal bulb in dogs found that peristaltic waves which start in the stomach passed successively over those regions and acted as one functional unit. These investigators found that the pyloric sphincter tended to be relaxed until a wave reached it and they concluded that it served mainly to prevent regurgitation rather than to regulate emptying of the stomach.

Thomas (54) recorded the difference in pressure between the gastric and duodenal sides of the sphincter and found that when there was food in the stomach the pressure was higher in the stomach than in the duodenum. If hydrochloric acid or pepsin were introduced into the duodenum through a fistula the sphincter relaxed and there was an equalization of pressure in the stomach and duodenum. This mechanism Thomas found was not disturbed by cutting the vagus nerve but operated through an intragastric reflex.

Crider and Thomas (9) also showed that the pyloric sphincter plays only a secondary rôle in controlling the emptying of the stomach. They found that there was no change in the emptying time of normal saline solution 5 per cent glucose 0.05 N hydrochloric acid 10 per cent olive oil or 10 per cent alcohol in dogs when a special tube was placed in the pyloric sphincter to keep it open continuously.

Babkin (1) from experiments with insulin and the secretory stimulus believes that hypophysis stimulates the vagus gastric secretory centers in the brain. He found that section of the vagus prevented the secretory effect of insulin. He advanced the theory that the vagus during activity liberates histamine or a histamine like substance which stimulates the cells of the gastric glands.

In summary of the experimental and clinical data which are available concerning the effect of vagotomy on the stomach of man it is apparent that our information is decidedly limited. Very few operations have been reported in which adequate removal of the vagus supply of the stomach has been done in man. It seems probable that in order to obtain the maximum effect of vagotomy the nerves must be cut no lower than just below the diaphragm and even this may not give an abso-

lute interruption, in view of the fact that Grondahl and Haney (26) found that some of the vagus fibers, in the dog at least, course downward within the wall of the esophagus. Frequently, as in the cases reported by Winklestein and Berg (72), one vagus nerve has been cut, but combined with this, another operation has been done on the stomach, so that the results obtained cannot be definitely attributed to the section of the nerve. Nor can the section of one nerve be expected to show the entire effect of vagotomy. We have little information on the emptying time of the human stomach after bilateral vagotomy, and it is impossible to say whether any lessened acidity obtained by the procedure would be counteracted by undesirable changes in gastric motility. It is probable that vagotomy will control more than the psychic phase of secretion alone, but just how important the vagus controlled secretion is in the etiology of ulcer we cannot say. One direct experimental attack on this problem was made by Schmidt and Fogelson (49) when they sham-fed dogs for ten to twelve hours a day for more than one hundred days. These investigators found no evidence of chronic-ulcer development in the dogs. However, the experimental data is hardly adequate to enable one to draw definite conclusions. Wangenstein and his coworkers (59) have recently been able to produce ulcers in cats and dogs by implanting under the skin a pellet of histamine in beeswax.

For many years attention has occasionally been directed to the occurrence of peptic ulcer in patients with lesions of the hypothalamus, (24, 17, 34, 39, 52, 13, 41). These ulcers have been observed in man and in experimental animals, but have also been observed following section of the vagus and splanchnic nerves and after celiac ganglionectomy in animals. Stimulation of the vagi, either by pilocarpine, or by electricity, has also produced lesions in the stomach. There is apparently some relationship between the hypothalamus and certain acute lesions of the stomach and duodenum, but there is considerable doubt about the relevancy of these findings to chronic peptic ulcer.

THE INTRAGASTRIC PHASE AND ITS MODIFICATION BY SURGERY

Secretion of gastric juice follows the entrance of food or its extractives into the stomach, and in addition to this direct stimulation there is also considerable evidence that there is a hormone, gastrin, which is liberated from the mucosa of the stomach and which passes into the blood and excites the gastric glands. Such a hormone, which is apparently not histamine, can be extracted from

the mucosa of the pyloric region of the stomach, and it is probable that both histamine and gastrin are active in gastric digestion.

The secretion of the gastric glands consists of mucus, pepsin, and hydrochloric acid, and of these three constituents, hydrochloric acid is the only one which has been definitely demonstrated to be of importance in the etiology of ulcer. Howes, Flood, and Mullins (32) have shown, by cutting a piece from the gastric mucosa of cats, that the healing of these defects is not affected by increasing the concentration of pepsin. Vanzant, *et al* (57), however, found that in cases of duodenal ulcer the concentration of pepsin was higher than normal, and they found this to be true also in jejunal ulcer. Their investigation showed that the concentration of pepsin increased with the increase of subjective symptoms and with the degree of the acuteness of the inflammatory process.

The gastric glands secrete acid which always has a concentration of 0.170 N, and an acid of this concentration is capable of digesting living tissue, such as a spleen, which has been implanted in the wall of an isolated gastric pouch. If such tissue is implanted in the wall of the intact stomach it is not digested, because the secreted acid is diluted by food, saliva, mucus, and regurgitated intestinal content. The gastric mucus has little diluting or neutralizing effect, as was shown by Wilhelmj, Henrich, and Hill (66) in studies in which an acid meal was introduced into a whole stomach pouch, and it is the other factors mentioned, particularly regurgitation, which are important in protecting the gastric mucosa against ulceration. By the use of an acid test meal and later by means of a specially prepared Liebig-extract test meal (30) containing phenol-red, Wilhelmj and his coworkers (69) have demonstrated the constancy and importance of duodenal regurgitation in regulating the acidity of the gastric contents. They have shown that the reduction in acidity of an acid test meal is due 75 per cent to dilution and only 25 per cent to neutralization. The duodenal contents consist of bile, pancreatic juice, and succus entericus, and of these three constituents, the pancreatic juice is the only one which contributes definite alkalinity. The other two components are nearly neutral in reaction and reduce the acidity merely by dilution. Wilhelmj, Neigus, and Hill (68) further demonstrated this diluting effect when they ligated the bile and pancreatic ducts and found that the acid meal was reduced in acidity less rapidly and less completely than before operation. They found that the pyloric secretion is almost as effective as the duodenal contents in reducing acidity, except that

not as large an amount of the former is available. Since Mann studies on drainage of the duodenal contents into the ileum by a short circuiting operation the importance of the duodenal secretions in the prevention of duodenal ulcer is generally recognized. Other similar evidence has been produced by Whipple and Hooper (6), who noted that ulcers followed biliary fistula by Blanck (5) who found that in such dogs the ulcers could be prevented by incorporating bile in the feeding of the dogs and by DeBakey (15) who studied the relative importance of the three contents of the duodenal juices and found the bile most important, the pancreatic juice next and the succus entericus least important.

Welch and Comfort (64) in their study of normal persons and persons with duodenal ulcer demonstrated the importance of duodenal regurgitation not only in preventing duodenal ulceration by diluting the acid as it enters the duodenum but also by diluting the acid in the stomach. They found that in normal persons dilution tended to be 100 per cent effective but in patients with duodenal ulcer this was rarely true.

There is another mechanism which apparently aids in preventing hyperacidity and this is the inhibition of gastric secretion by the secreted acid itself. Wilhelmj, O'Brien and Hill (10) found that when acid of increasing concentration was placed in whole stomach pouches the secretion of acid ceased when the concentration of the acid reached 0.06 normal (60 clinical units). This inhibition is apparently of intragastric origin since it occurred in a stomach isolated from the intestine and is probably not due to the action of a hormone.

Surgical procedures which are used in the treatment of gastric or duodenal ulcer may, with the exception of those in which the ulcer itself is resected, be divided into two groups: (1) those which are designed to increase duodenal regurgitation and (2) those which are designed to reduce the amount of acid secreted by the stomach. The first class includes pyloroplasty, gastroduodenostomy and gastrojejunostomy. The second includes vagotomy, partial gastrectomy and resection of a portion of the body of the stomach.

Other types of procedure have been used which involve closure of the pylorus or drainage of the duodenal secretions into the jejunum below a gastro-enterostomy (anastomosis en Y) but these operations have been largely discarded because of the high percentage of secondary ulcer which follows their use.

Pyloroplasty in the treatment of duodenal ulcer has two advantages: it may be combined with ex-



Fig. 1. Performing lateral gastroduodenostomy. The film effort in the patient is divided laterally. The duodenum which all the film effort from the stomach is deposited in (VCH Int. M. G. M. T. Peptic Ulcer).

cision of a duodenal ulcer and it does not expose the patient to the risk of a jejunal ulcer. Unfortunately the clinical results of this operation have not been particularly good, probably because as shown by Hill, Henrich and Wilhelmj (8) the amount of duodenal regurgitation is increased very little. In the presence of a high acidity and poor duodenal regurgitation this procedure is probably not advisable unless direct attack on a bleeding duodenal ulcer seems imperative.

Gastroduodenostomy as modified by Kocher (36) (incision of the parietal peritoneum to mobilize the second part of the duodenum) has certain definite virtues. This operation apparently provides according to the work of Hill, Henrich and Wilhelmj (28) on dogs the greatest amount of regurgitation. Because of the greater resistance of the duodenum to acid there should be less chance of secondary ulceration than when a gastrojejunostomy is done. Clute and Sprague (1) however in 5 patients who underwent gastroduodenostomy did not find evidence of adequate dilution. In fact the total and free acid after operation was found to be as high as or higher than before operation. Clinical reports on gastroduodenostomy have shown that secondary ulcer is rare but may occur (Wilki (71) 2 cases in 159 gastroduodenostomies, Graham (21) 1 case in 9 gastroduodenostomies, Hunt (33) 1 case in 22 gastroduodenostomies). This is apparently a considerably lower incidence than that reported for



Fig 2 Mobilization of the duodenum facilitates its approximation to the antrum of the stomach without angulation or undue tension (V C. Hunt)



Fig 3 The anastomosis is constructed without the use of clamps on either the stomach or the duodenum (V C. Hunt.)

gastrojejunostomy, but the greater difficulty of dealing with such a secondary ulcer if it occurs is a grave objection to the operation.

The mechanism by which gastrojejunostomy contributes to the healing of duodenal or gastric ulcer is, aside from the relief of pyloric obstruction, due to the increased regurgitation of duodenal contents into the stomach. A reduction in the gastric acidity following posterior gastroenterostomy was reported by Walters (31) to occur in from 30 to 50 per cent of his cases. Holman and Sandusky (31), on the other hand, found lowered acidity in only 8 per cent of 75 patients and Tomoda and Aramaki (35) found no uniform change in the acidity in 32 cases. It must be noted that these findings were obtained by the use of an ordinary test meal which gave no indication of the amount of regurgitation which may have occurred and further clinical study would seem to be indicated before this point can be settled.

Of the two types of gastrojejunostomy, anterior and posterior, the latter would seem to be preferable as far as the resistance of the jejunum is concerned. It is a well known fact that the farther down in the intestine one operates the less resistant the mucosa is to acid. Comparatively few gastrojejunal ulcers have been reported following the anterior type of anastomosis but of course fewer of these operations have been done. Leaving aside the question of the incidence of marginal

ulcer Lahey and Swinton (38) believe that a gastrojejunal ulcer occurring in an anterior gastrojejunostomy is easier to deal with than one in a posterior stoma, and Lahey believes that he himself would feel safer with an anterior anastomosis. If an anterior anastomosis is used an enterostomy should not be made because of the fact that it short-circuits the protective duodenal secretions around the stoma.

The acid of the stomach is secreted entirely by the body and the fundus; the pylorus secretes only mucus. When the pyloric antrum is removed and an anastomosis made between the stomach and the jejunum there is left a wide stoma through which a great deal of duodenal regurgitation occurs (Hill, O'Brien and Wilhelm) (30). In addition to this factor of dilution, however, there is a reduced acid secretion and lowered acidity which is not accounted for by the diluting factor. Apparently some stimulus to the secretion of acid by the fundus originates in the pylorus. According to the work of Grindley (25) who studied on dogs with fundic pouches of the Heidenhain type with and without the pylorus the removal of the pylorus has no effect on the secretion of acid in these pouches. Grindley considers such a pouch to be vagus-denervated and this would seem to imply that any change in secretion produced by removal of the pylorus is mediated through the vagus nerve. This conclusion has

ever is questionable because there is considerable doubt whether a Heidenhain pouch is actually vagus denervated. Grindley offers another explanation of the lowered acidity after partial gastrectomy, stating that since in most resections more than the pyloric antrum is removed the removal of some of the acid secreting glands of the body of the stomach might account for it.

There is available considerable clinical data on the effect of partial gastrectomy on gastric acidity. Walters and Wolff (61) stated that relative achlorhydria results in about 25 per cent of cases following the Billroth I resection for duodenal ulcer. Klein Aschler and Crohn (35) report the same findings in from 60 to 70 per cent following a Polya operation. St. John and his coworkers (53) found absence of free hydrochloric acid in 22 of 26 patients after partial gastrectomy. St. John was under the impression that in some of the patients with anacidity, not even the entire pyloric antrum had been removed, and thus the removal of the acid secreting glands could not explain the reduced acidity. These workers also found marked diminution in the peptic activity of the gastric juice in nearly all cases.

Tomola and Aramaki (55) found free hydrochloric acid either absent or very low in 70 cases following gastric resection. Milanes (45) studied 70 cases in which subtotal gastrectomy had been done, paying particular attention to those in which there was persistent free hydrochloric acid. In these cases they injected 1 mgm of atropine sulfate subcutaneously and demonstrated that the residual acidity was due to the active agency of the vagus. Winkelstein and Berg (72) found that there was some relation between the pre-operative acidity and the location of the ulcer. In the cases of patients with gastric ulcer an achlorhydria invariably resulted from partial gastrectomy regardless of whether the pre-operative acidity was high or low. In patients with duodenal ulcer or an ulcer near the pylorus with a high pre-operative acidity, achlorhydria rarely resulted from the operation. In patients with duodenal ulcer a postoperative achlorhydria usually developed if the pre-operative acidity was normal. If an anterior vagotomy was combined with a partial gastrectomy in cases of duodenal ulcer with high pre-operative acidity, achlorhydria commonly occurred (77 per cent). Wilhelmj, McCarthy, and Hill (67) cut both vagus nerves in the thorax and did a partial gastrectomy on dogs. Only 33 per cent of these dogs developed anacidity, but the acidity was lower than that which followed partial gastrectomy alone. In regard to reduction in acidity because of the re-

moval of a portion of the body of the stomach it must be admitted that it has been found by practical experience (19) that the best clinical results are obtained by resection of from two-thirds to three-fourths of the stomach, which would of course include more than the antrum but in view of the experimental results obtained by antrum which will be discussed under fundusctomy, the question comes up whether a reduced acidity obtained by such means will be permanent. Of two types of resection in common use, the Billroth I and the Polya, each has certain definite advantages. The Billroth I or the Von Haberer or other modifications of it exposes only the comparatively resistant mucosa of the duodenum to the gastric juice and should lead to fewer secondary ulcers. On the other hand the operation which is known by Polya's name but which Polya himself (47) believes was first performed by Kroenlein in 1888, provides a wider stoma and consequently greater opportunity for duodenal regurgitation and is probably more easily performed by the average surgeon.

Vitkin (58) made roentgenological studies of the stomachs of 67 patients in whom a Billroth II was done and claimed very excellent results as far as the emptying of the stomach was concerned. He believes that the periodic opening and closing of the stoma is due to peristaltic contractions and dilations of the efferent limb of the bowel. Shekhter (51) on the other hand, in a study of 60 cases of partial gastrectomy, believed the first method of Billroth or its modifications to be preferable as far as motor function is concerned. He found that the Billroth II left a smaller stomach and that the afferent loop of the bowel tended to fill up.

Walters (60) believes that recurrent ulceration is much more common after the Billroth I operation than after the Polya, even when the antrum has been removed.

In any case partial gastrectomy, even if an adequate amount of the antrum has been removed, is no absolute assurance that recurrent ulceration will not occur. Lahey and Marshall (37) reported 7 per cent and Cutler (14) 3 per cent in their cases in which an extensive resection was done, but the former figure at least is certainly higher than is reported by most clinics.

In order to attack directly the acid secreting glands of the stomach, Connell (8) in 1919 devised an operation which he termed fundusctomy. In this operation a portion of the body and fundus of the stomach along the greater curvature is resected with the idea of reducing the amount of acid secreting tissue of the stomach.

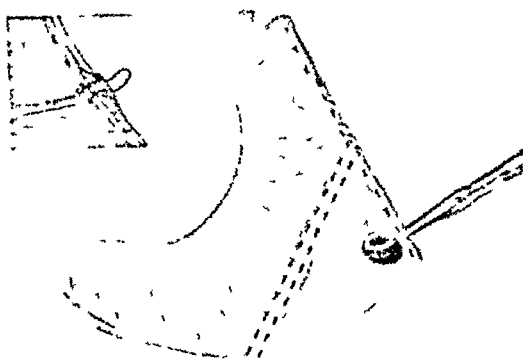


Fig. 4. Wangensteen's method of fundusctomy using Petz clips which are to be inverted.

In experiments on dogs Connell found that the free and total acidity was reduced immediately, and that the free acid remained low but the total acidity returned to the pre-operative level in about three months. He also found that the emptying time of the stomach was delayed during the first six weeks. DeClosers and Johnson (16) found similar reduction in both the free and total acidity in studies made from the tenth to twentieth day after operation. Mann (40) found that after a resection of the fundic portion of the stomach and surgical duodenal drainage, the resulting ulcers developed more slowly than usual and became more indurated. Watson (63), in experiments on dogs, found that there was a definite relation between the reduction in acidity and the amount of fundus removed and that unless about four fifths of the fundus was removed the changes were not constant. In studies made at the expiration of four months (a month longer than Connell observed his dogs) the changes were much less definite, even when a very low acidity had originally been present.

Seely and Zollinger (50) removed extensive portions of the greater curvature of the stomach, and attempted to leave only a tube from the esophagus to the antrum. One month after operation there was a definite drop in the free and total acidity, but three months after operation the acid began to rise, and eight months after operation had reached normal. At this time the stomach had also reached approximately normal size, but few new rugae had formed. These authors concluded that within the period studied, the hypertrophy of the stomach does not extend to the production of new rugae. In the newly formed stomach there was apparently a normal distribution of acid-forming cells throughout. They also found that the number of glands per millimeter originally



Fig. 5. Anastomosis after the Wangensteen resection.

present was the same in the region of the lesser curvature as in that of the greater curvature and that the only reason the greater curvature secretes more acid is because of the reduplication of the mucosa in folds.

Ochsner, Gage, and Hosoi (16), removed the greater curvature of the stomach (fundusctomy) in some animals and the lesser curvature in others. In those cases in which the greater curvature was removed, the incidence of ulceration was high (63.6 per cent), whereas in those in which the lesser curvature was removed, no ulceration developed. They attribute this to a greater susceptibility of the lesser curvature to ulceration.

Babkin (2) states that in the region of the pylorus and lesser curvature, there are from 320 to 150 nerve cells, in the region of the fundus, 80 to 200, and in the region of the body 250 to 320. He believes that because of this abundant supply in the region of the lesser curvature, this part of the stomach is more under the control of the vagus and less under the control of the hormones than the remainder of the stomach.

Wangensteen (62) has described an operation in which he removes a large portion of the fundus of the stomach and combines this with a gastrojejunostomy. He has operated on 9 patients by this method and finds that the stomach empties very rapidly and is achlorhydric, even to histamine. In the 1 patient who still has free hydrochloric acid, the upper fundus beyond the insertion of the esophagus was not removed. Wangenstein suggests that in young patients it may be desirable to omit the gastrojejunostomy. He states that following the operation the patients sometimes complain that the gastric capacity is

too small but as time goes on these complaints stop

THE INTESTINAL PHASE OF GASTRIC SECRETION

When digestive products reach the intestine they are absorbed pass into the blood stream and reach the stomach where they act as secretagogues. This phase of secretion is inhibited by acid in the duodenum and enterogastrone which Ivy and his co workers have extracted from the intestinal mucosa may be concerned in it. The secretion of gastric juice in the intestinal phase and also in the gastric and physic phase is inhibited by fat and there is some evidence presented by Lam and Ivy that chalone a hormone may be the active factor. Peristalsis in the stomach is regulated not only by food in the stomach but also by the presence in the intestine of hydrochloric acid fat products of starch or protein and hypertonic or hypotonic solutions. Mechanical distention of the intestine has a similar effect.

No surgical application has been made of the intestinal phase of gastric secretion but it has long been utilized in medical treatment by the use of cream in the treatment of ulcer. The intestinal phase of secretion produces a long continued acid secretion and its surgical control would undoubtedly solve a great deal of the ulcer problem. At the present time our information is so limited that one cannot even suggest a method of attack.

It is of a great deal of interest that Gray, Wiczorowski and Ivy (23) have extracted a substance from the urine which depresses gastric secretion. It resembles enterogastrone but does not affect gastric motility. Culmer, Atkinson and Ivy (11, 12) found the gastric secretory depressant to be heat stable but an extract prepared by Friedman *et al* (20) was heat labile. The latter substance protected Mann-Williamsen dogs against ulcer. Brunschwig and his co-workers (6) have found a heat labile principle in the gastric juice of patients with pernicious anemia or carcinoma of the stomach which inhibited gastric secretion. Gray and his co-workers (22) have recently been able to prepare a gastric inhibitory factor (urogastrone) from normal male urine which is free from pyrogens.

COMMENT

The only consideration which should enter into the choice of operation for ulcer is the cure of the patient and with the proper indications for surgery no operation which will permanently relieve peptic ulcer is too radical if the patient can survive it. An extensive partial gastrectomy will

produce anacidity in most patients but this operation unfortunately carries with it a mortality which is higher than other procedures. If a bilateral subphrenic vagotomy were combined with a pylorotomy there should be no free acid in most cases but we do not know what undesirable concomitant effects might result from such vagotomy. When a partial gastrectomy is done it would seem that a *Billroth I* type of anastomosis would be preferable to a *Billroth II* because of the large stoma of the former with greater opportunity for regurgitation and dilution of any persisting acid.

There are patients in whom a partial gastrectomy is contraindicated because of their physical condition and in other patients in whom partial gastrectomy is possible careful study may show that it is not necessary. We are not certain that complete anacidity must be produced to prevent recurrent ulcers nor do we have absolute assurance that even if anacidity is produced no stomal ulcer will develop although its development would be extremely unusual.

In selecting an operation to fit the patient before any decision is made an attempt should be made to determine (1) the extent of influence which the vagus nerve exerts in the hyperacidity in that particular case and (2) the amount of duodenal regurgitation. In this investigation there will be found patients in whom the vagus stimulated secretion is large in amount and it is in these that vagotomy should be expected to produce its most satisfactory results. Other patients may be found in whom duodenal regurgitation is effective but who nevertheless have hyperacidity. In these cases gastro-enterostomy which is designed only to increase regurgitation will probably have little beneficial effect and will result in frequent marginal ulcers. On the other hand it is in the patients with low acidity and poor regurgitation that gastro-enterostomy should achieve its best results. In patients on whom a more extensive operation than gastro-enterostomy seems necessary and on whom a partial gastrectomy would be done at too grave a risk some type of fundusctomy combined as Wangenstein suggests with a gastro-enterostomy may be considered. It is possible that if a large stoma is made so that the stomach empties very rapidly there may be less hypertrophy of the remaining portion of the stomach and a permanent anacidity may be attained.

The newer work on acid inhibiting substances offers a great deal of promise and it is to be hoped that the opening of this new avenue of approach may lead to an entirely safe and satisfactory treatment for peptic ulcer.

SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

Berti Riboli R. An Experimental Study of the Value of Anti Peritonitic Sera (Vl. tera peut. o de c. a tiprituci Rice che peni me tal) *Pid. Rome* 940 47 se chr 301

The author reviews the work previously done on the use of anti peritonitic sera. He finds that while good results are reported in general there is such a great discrepancy in the findings of the different authors on various points that it invalidates the scientific value of their conclusions. They differ in regard to the nature of the sera whether sera should be made against the streptococcus enterococcus bacillus perfringens and in regard to the method of administration and the dosage.

Berti Riboli therefore performed experiments designed to clear up some of these differences and determine the real curative and therapeutic value of such anti peritonitic sera. He chose rabbits instead of guinea pigs as experimental animals because they are more resistant to peritonitis. He divided them into groups of 5 and gave each group a different treatment as to kind of serum method of administration and dosage using 1 animal in each group as a control. Peritonitis was brought about by introducing into the peritoneal cavity fresh feces followed by fine sand. The purpose of the latter was to produce mechanical irritation and thus further the development of peritonitis. Peritonitis was produced in all of the cases within twenty-four hours. The peritocoles of the various experiments are given.

The author found that anti peritonitis serum no matter how prepared by what method given or in what dosage does not appreciably change the course of the experimental peritonitic infection. There was no difference in the course of the disease in the experimental animals and the controls and no difference

in the histological findings after death. There was no difference in the course of anti streptococcal anti tetanic anti diphtheric and the various other kinds of sera. Therefore the different anti peritonitic sera in use at the present time do not have any specific action. As a rule the animals die within from forty-eight to seventy-two hours no matter what the kind of serum or the dose given. The author believes the differences in time in the different cases were not due to different specific action of the various sera or to different dosages but to differences in individual resistance of the animals. No prophylactic action was seen in the cases in which the anti peritonitic sera were injected before infection.

In certain groups the sera were given after the usual surgical treatment for peritonitis such as laparotomy and drainage of the peritoneal cavity. These animals survived longer than those of the other groups but there were no great differences in the clinical signs or in the bacteriological or histological findings. The fact that there were no differences in these groups when treated with the different sera also shows the non-specificity of these anti peritonitic sera.

ADREY G. MORGAN, M.D.

Tucci P. Technical Points in Bassini's Operation (P. t. l. n. d. i. c. n. i. c. n. l. o. p. r. a. i. n. d. i. B. s. i. n. i.) *C. n. ch.* 1940 6 59

The general method of Bassini's operation for hernia is well known and almost universally practiced. However as Bassini did not describe all the details of his procedure minutely there are some variations in carrying it out. The method described here was introduced by Turchi. It has been carried out in 212 cases both of femoral and strangulated hernia in the past two years. The cases have been followed up quite carefully and not a single re-



Fig 1

Fig 2

Fig 3

Fig 4

Fig 5

Fig 1 Skinning the abdominal wall. Fig 2 Reducing the hernia. Fig 3 Repairing the hernia with a suture. Fig 4 Repairing the hernia with a suture and a mesh. Fig 5 Repairing the hernia with a suture and a mesh, with the mesh being secured to the abdominal wall.

currence has been observed. It has been used with equally good results in 7 cases of recurrence, 1 with strangulation. It differs in only a few points from the classical Bassini operation.

The incision, from 8 to 10 cm long, starts from about the middle of the external inguinal ring and runs outward and upward, diverging somewhat upward from the inguinal ligament (Fig 1). This is done so that the skin suture will not coincide with that of the aponeurosis of the greater oblique muscle which is incised parallel to the inguinal ligament.

Contrary to the custom in other methods, the transversalis fascia is incised before the hernial sac is isolated (Fig 2). This makes the isolation of the sac easier, simpler, and more complete (Fig 3).

Another essential point in this modification is the suture of the aponeurosis of the lesser oblique muscle to the inguinal ligament (Figs 4 and 5). This reinforces the wound and healing takes place more readily between the two layers of aponeurosis than it does between two layers of tissue of different kinds. It abolishes any dead space in the posterior wall of the canal and prevents the passage of any droplets of preperitoneal fat which often cause recurrence.

Reference is made to the experimental work of Seelig and Chouke in *SURGERY, GYNECOLOGY and OBSTETRICS*, 1924, pp 412-420, in which they show that fascia should be sutured to fascia in order to reinforce the abdominal wall.

AUDREY G. MORGAN, M.D.

GASTRO-INTESTINAL TRACT

Weintraub, S., and Tuggle, A. Duodenal Diverticula. *Radiology*, 1941, 36: 297.

In order to answer the question whether duodenal diverticula may give rise to clinical symptoms, the writers reviewed a series of 310 cases submitted to gastro-intestinal x-ray examination, all of which revealed a diverticulum of the duodenum. There were a total of 349 diverticula varying in size from a few millimeters to 7 cm in diameter. These diverticula arise from any portion of the duodenum, but most frequently from the internal or pancreatic border. The lesions were usually found in proportion to the care with which fluoroscopy was conducted. The majority arose from the inner border of the second portion of the duodenum (66 per cent).

If one congenital defect is found in the gastro-intestinal tract, others are likely to be present in the same individual. This statement is borne out by the frequency of diaphragmatic hernia, i.e., the short esophageal or congenital type. Diaphragmatic hernia was present in 9 per cent of the cases. At the same time diverticula of the colon existed in 45 instances. Diverticulosis of the esophagus, duodenum, and colon occurred in 2 patients.

Among the associated pathological conditions in the upper abdomen, there were 40 duodenal ulcers, 36 diseased gall bladders, 6 gastric ulcers, 6 gastric carcinomas and 3 cancers of the pancreas.



Fig 1. Diverticulum of the third portion of the duodenum showing a parallel mucosal pattern.

From the clinical aspect the writers could not state in a single case that the symptoms were caused by the pathological changes in a diverticulum. In 14 autopsy examinations, and in 3 surgical specimens in which duodenal diverticula existed, inflammatory reactions were present in only 1 instance.

B. R. KIRKLYN, in discussing the paper, stated that it was his belief that duodenal diverticula are common, have little if any significance, and seldom, if ever, warrant surgical intervention.

JOHN W. NUZZUM, M.D.

Allen, A. W., and Welch, C. E. Jejunostomy for the Relief of Malfunctioning Gastro-Enterostomy Stoma. *Surgery*, 1941, 9: 163.

Causes of malfunction are first discussed. Numerous procedures to correct the fault are available, namely, entero-enterostomy, a second gastro-enterostomy, duodenojejunostomy, gastrostomy, jejunoplasty, and jejunostomy. The latter has been used extensively in the past and is believed to be becoming more popular. Its advantages are enumerated as (1) the simplicity of the operation, (2) the gastrojejunal anastomosis is left in the exact condition that it was planned originally, and (3) the patient's nutrition is maintained until edema of the anastomosis subsides and obstruction is relieved.

Allen and Welch have drawn on the cases seen in the Massachusetts General Hospital during the pe-

ried from 1936 to 1940 inclusive. In a series of 282 gastric operations jejunostomy was resorted to in the cases of 15 patients with a mortality of 27 per cent.

When jejunostomy has not been done as a preliminary procedure or as a concomitant operation in gastric surgery, the patient must be carefully observed for any signs of postoperative obstruction. Fluid intake is noted and compared with the amount aspirated from the Levine tube. If the amount swallowed exceeds that withdrawn, the gastric balance is positive; if the output is greater, the gastric balance is negative. Usually there is a slight negative balance of from 100 to 200 c.c. during the first forty-eight hours; the balance then becomes positive and remains so. Cases in which the gastric balance is first positive for from six to eight days and in which obstruction then follows have a comparatively good prognosis; those with immediate obstruction will practically always require a jejunostomy at an early date.

If the balance is negative and obstruction is definitely present, watch the patient for a short time. However, do not wait until the patient actually needs the jejunostomy to maintain his general condition. Allen and Welch believe that reoperation should be done in the older age group a week after obstruction has occurred for those under fifty years of age it may be deferred for a few more days if the patient is in good condition and if there are data that offer hope for improvement.

When reoperation is necessary, certain technical details are important. Spinal anesthesia, evipal or local novocain block may be used. An adequate incision is necessary, re-opening of the previous operative wound is recommended. Correction of any mechanical cause should be supplemented by a jejunostomy. The efferent loop of jejunum should be identified and visualized over a distance of 18 in. below the site of anastomosis for band obstructing the intestines.

The loop of jejunum is selected for insertion of the tube must lie comfortably just beneath the left costal margin in the nipple line without tension. Usually this is about 12 in. below the anastomosis. The stomach must not be too low or too near the midline. The jejunum is carefully protected and a purse string suture of No. 00 chromic catgut is introduced. The jejunum is opened and a No. 16 French white tipped catheter is inserted with the tip pointing distally down the jejunum. Introduction of the catheter is often facilitated by the gentle insertion of normal salt solution through the catheter with an aseptic syringe during the time the tube is being inserted. After 6 in. of the catheter have been placed within the jejunum, the purse string suture is tightened and then carried through the wall of the catheter to anchor it. A second inviting purse string suture is placed about the catheter not more than 2 in. outside of the original. The catheter is then brought through a small opening in the great omentum and out through a stab wound in the

left subcostal area. In the experience of the authors this procedure has proved more satisfactory than the Witzel type of jejunostomy.

This procedure is followed by a period of waiting until the edema about the original anastomosis subsides and stomal obstruction is relieved. In this series relief occurred from fourteen to fifty days after resection with an average of twenty-two days. During this interval nutrition must be maintained and the stomach kept empty by an infusing nasogastric tube. No single diet can be specified. So far as is possible, the contents aspirated from the stomach should be returned into the jejunum. In early feeding milk and lime water mixed in equal parts are usually best tolerated. Saline solution often starts a severe diarrhea; this may be avoided by using tap water as a basis for any feedings employed. Frequent determinations of the blood chemistry must be made. Patency of the stoma may finally be determined by the use of barium meal. As soon as the gastric balance becomes positive, improvement is rapid. The tube is usually removed a few days after the gastric balance is satisfactory. When the patient's condition has definitely improved, jejunostomy feedings should be withheld periodically for twelve hours.

From this series it is estimated that about as many patients are treated in a conservative fashion as by reoperation. All severe forms of obstruction are treated by reoperation and all of the reoperations, with one exception, were jejunostomies. The exception being an enteroenterostomy following which the patient recovered. There were no postoperative deaths in the group of patients who were fifty years of age or under, all of whom were operated upon for ulcers. Ten of the patients were over fifty years of age. The ultimate result in this group did not seem to depend so much upon the underlying cause as upon the time of operation for all of the patients who had undergone jejunostomy less than ten days after the obstruction began to need it. Of the remaining 5 patients 4 died when jejunostomy was delayed for more than ten days. Case reports are included.

F. R. G. S. D. M. D.

Spatali and B. Triple Occlusion of the Intestine from V. Involus of the Cecum and Retroperitoneal Constriction of the Small Intestine and Colon
(T. pl. cl. n. i. t. st. ale. mb. ata. d. l. l. d. l. eco. d. st. 22. m. nt. c. pr. c. d. l. t. e. e. d. c. l. n.) Cl. A. 94. 6. 493.

A man of sixty-seven years was sent to the hospital with a diagnosis of acute occlusion of the intestine. He had had symptoms of this condition for four days. The patient was in a bad general condition and presented a large mass in the right iliac fossa. A probable diagnosis of volvulus of the cecum was made and the abdomen opened. An enormously dilated loop of intestine presented itself which was constricted as the cecum and a part of the ascending colon twisted a half turn from right to left around the ligamentum mesocolon. Decompression was brought about by manual manipulation. It was found that the cecum

and ascending colon had a complete mesentery and were therefore very mobile. However, there was also a strong cordlike adhesion connecting the upper part of the ascending colon with the corresponding part of the descending colon. This bridge of adhesions had constricted the loops of small intestine below it which in turn exercised pressure on the segments of the ascending and descending colons that were connected by the adhesions.

An assistant lifted the adhesions while the surgeon freed the constricted loops of small intestine with considerable difficulty. The adhesions were excised and the wounds covered with peritoneum, the loops of the small and large intestine were restored to their normal position.

The cecum was fistulized in the right flank, however, in order to evacuate the toxic material that had been accumulating for four days. After a few days, normal evacuation was re-established and in a week the sound could be removed. The fistula gradually closed and on the thirty-fifth day the patient was discharged cured.

Such a triple occlusion is extremely rare. The author thinks that the first step was the volvulus of the cecum which occurred because of the long meso acted upon by some other factor, such as intestinal fermentation. There had been preceding colocolic adhesions, however, and the volvulus of the cecum was followed by distention of the loops of small intestine which were constricted by the inelastic bridge of adhesions. They in turn exercised pressure on the loops of colon connected by the adhesions.

The author discusses the value of his method of operation in such cases and thinks it fortunate that no signs of gangrene had occurred in this case after four days of occlusion for the patient had not been in a condition to bear an extensive resection. He believes that a diagnosis of multiple occlusions cannot be made before operation. A simple diagnosis of occlusion can be made, and the operator must discover any additional occlusions that may exist.

AUDREY G. MORGAN, M.D.

De Quervain, F. One Half-Century of Appendicitis (Un demi siècle d'appendicite) *Rev. méd. de la Suisse Rom.*, 1941, No. 1, p. 2.

This paper was presented before a conference dedicated to the memory of César Roux. The first portion is chiefly a historical review of the subject of appendicitis with particular reference to the influence of Roux and his interne, Charles Krafft, who were among the first Europeans to urge early operative treatment for appendicitis, in the latter part of the nineteenth century.

The decline of mortality from appendicitis in European clinics is traced from the 9.6 per cent reported by Sahli in 1895 to the 7.8 per cent in the collected statistics of the Swiss hospitals from 1908 to 1912. In 1926 Clairmont reported a mortality rate of 4 per cent, and in the author's report of cases seen from 1928 to 1937 the mortality rate was 2.8 per cent. Early hospitalization and early operation

are given credit for this reduction of mortality and the author implies that the figure could be much lower if all suspected cases of appendicitis could be operated upon within the first twenty-four hours.

The author's ideas concerning diagnosis and details of operative treatment are also discussed in this memorial address.

EDWARD W. GRUBS, M.D.

Lucca, E. A Clinical and Histopathological Contribution to the Study of Chronic Appendicitis (Contributo clinico ed istopatologico allo studio dell'appendicite cronica) *Clin. chir.*, 1940, 16, 770.

Lucca presents a study of 50 cases of undoubtedly primary chronic appendicitis. 19 were observed in males and 31 in females. The age distribution was as follows: 5 patients were under the age of twenty, 17 patients each between twenty and thirty years and between thirty and forty years, 9 between forty and fifty years, and 2 more than fifty years old. The cases were divided provisionally into four groups on the basis of their histological characters: the first group included 6 cases which presented histological characters that could not be entered into the classifications proposed by various authors, but which showed simply some signs of chronic inflammation here or there; the second group included 24 cases which were characterized especially by hyperplasia and hypertrophy of the lymphatic follicles; the third group included 17 cases which were characterized by connective-tissue neoformation or sclerosis; and the fourth group included 3 cases of obliterated appendix. However, considerations of general order suggested that the various types of chronic appendicitis should be divided, on the basis of histological findings, into two distinct groups: only the lymphatic hyperplastic and the sclerotic groups. The obliterating form would represent a result of the sclerotic form.

Although the classification into two large groups reflects their general characters, there is nevertheless a rather large scale of histological types in which the microscopic signs are extremely varied and show multiple gradations. When the two large groups are accepted, there still remain particular characters for each case in analogy with what is observed in the clinic, and it may be said that no two cases are the same. There are cases showing a gradual transition from one form to the other in which the signs of one group may be associated more or less profusely with those of the other group. Every group is characterized by the basic lesion of a certain element of the appendix which stands out as the preponderant finding, but there are also constant lesions of other elements, and this lends a characteristic aspect to the whole. The relations of thickness of the various layers of the appendix are especially changed because of the predominance of the lesions of the involved element, but at times those relations seem to be maintained, either because the process involves the various layers simultaneously and to the same degree, or because in some layers the destroyed elements have been replaced by newly formed tissue (connective tissue replacing muscular tissue).

All the authors who have described the various histological types speak of successive pictures with progressive development which gradually from an initial lymphatic stage to one of connective tissue formation in its natural evolution the connective tissue becomes sclerosed and destroys the other elements which it finally replaces completely. This concept is suggestive if it is desired to unify histologically the morbid picture of primary chronic appendicitis but cannot be accepted *a priori*. If it were only a question of various stages of a single picture the conclusion would impose itself that all chronic appendicitides evolve from the first to the last stage and show a different aspect in accordance with the stage in which they are observed. However this does not correspond to the clinical facts. It is more logical to think that some cases tend to maintain the anatomical distribution of the nerved layer (mucosa and lymphatic follicles) parallel with the clinical sign while other cases tend toward a successive evolution in which the invasion by the connective tissue predominates and replaces gradually all the other elements and may even end by obliterating completely the lumen of the appendix.

In the cases studied it was impossible to establish any relation between the clinical facts and the histological findings but this absence of parallelism is more apparent than real because the clinical symptomatology is not always clear and even the most careful anamnestic investigation runs often into insuperable difficulties. Finally the number of cases studied is too small to allow the establishment of a numerical relation between those with lymphatic development and those of sclerotic type.

RICHARD KEMEL, M.D.

LIVER GALL BLADDER PANCREAS AND SPLEEN

Carli C. Autolysis of the Liver (La tologia patologica) 114 d. R. m. 94 47 ch. 345

Sometimes after operation on the liver or bile ducts a very acute syndrome develops consisting of hyperpyrexia, excitement and encephalopathy, dizziness, which not infrequently results in the death of the patient in coma. This has been attributed by some authors to the re-uptake of autolysis of the liver tissue. The author cites arguments on the subject from the literature.

He then describes his own experiment with rabbits and dogs carried out for the purpose of settling this vexatious question. He describes his technique and gives the protocols of the experiments.

He found that the implantation of dog's liver in the peritoneal cavity of the dog causes death of the animal in from eighteen to thirty hours. There is a copious hemorrhagic exudate and intense congestion of the peritoneum. The fragment of liver rapidly undergoes gangrenous necrosis with development of gas (foamy liver). There are serious degenerative lesions in the liver and to a lesser degree in the kidneys.

The grafting of rabbit's liver into the peritoneal cavity of the rabbit does not do any injury that hinders the life of the animal. The fragment of liver undergoes simple aseptic necrobiosis. There are no changes of any kind in the liver or kidneys.

The implantation of dog's liver in the peritoneal cavity of the rabbit does not cause death of the animal or any changes in the liver or kidney even though the fragment of liver undergoes complete autolysis. The rabbit's peritoneum has a much greater bactericidal action than that of the dog.

The difference in the findings in dogs and rabbits is due to the presence of anaerobic bacteria living in a saprophytic state in the dog's liver. The cause of the death of the dog and the changes in the liver and kidneys is a toxic infection due to the development and the virulence of these bacteria which find a very favorable medium in the mortified liver and cause a very acute diffuse peritonitis. The absorption of suppurative toxic products of autolysis has nothing to do with the death.

Simple traumatic lesions of the liver even if severe and multiple do not cause death of either dogs or rabbits nor do they produce changes in the liver or kidneys.

The cause of death which sometimes quickly follows operations on the liver or bile tract in human beings is acute insufficiency of the liver which may or may not be associated with insufficiency of the kidneys. It is not autolysis of the liver tissue.

AUDREY G. MOGAN, M.D.

Muell R J. Traumatic Secondary Hemorrhage of the Spleen (D. traumatische Splenotomie) 114 d. R. m. 94 47 ch. 376

The spontaneously occurring hemorrhages of the spleen are not a rarity in Europe. They occur following infectious diseases and organ changes in the splenic vessels in the psychical hypertrophy of pregnancy and in inoculation malaria. However spontaneous ruptures in perfectly normal organs have also been observed. The chronic rupture of the spleen is rare. The author was able to collect only 83 observations.

The clinical picture is often indistinct and ambiguous. Other diseases are simulated. The concept of traumatic secondary hemorrhage is not held uniformly. The author speaks of repeated hemorrhage when a considerable period of time elapses between the injury and the hemorrhage. The sudden appearance of a considerable time after the injury is characteristic of the second hemorrhage. The nature of the forced event gives no clue to the onset of a repeated hemorrhage of the spleen. The decisive factor whether the splenic rupture is at one or several times is its content of blood at the time. An exudate of blood may form at first only under the capsule and then finally rupture it. If the capsule and paracapsular rupture simultaneously the hemorrhage may come at first from contraction of the blood vessels, thrombosis or low running of the blood pressure. The sudden loss of blood according to

animal experiments, produces a rapid contraction of the spleen. Adhesions of the spleen may limit the hemorrhage and stop it temporarily.

There then follows a tabulated enumeration of the 88 observations reported in the literature, and also a report of 3 of the author's own observations. All of the latter were preceded by an immediate rupture of the spleen. Even a slight exertion of force may produce an extensive injury of the spleen. More important than the severity of the injury is the position of the spleen during the time of the exertion of the force.

Three stages in the clinical course of repeated hemorrhages of the spleen can be differentiated. In the first stage the symptoms of shock are predominant, in the second stage the general condition improves, and in the third the hemorrhage has its onset. The injured person almost always feels well in the second stage, but often bridging symptoms in the form of a feeling of pressure or colics are found on closer follow-up examination. The important symptoms are the pains in the left shoulder, rises of temperature, and muscular spasms. An increasing loss of blood could not be determined. An increase in the number of leucocytes is also found with the seat of the hemorrhage at another site. A differentiation between crushing and rupture of the spleen is not easy. The injury of the spleen may produce a picture similar to that of intermittent fever. The secondary rupture of the spleen usually occurs as the result of a slight cause (coughing, vomiting). The site of the rupture of the capsule does not correspond with that of the parenchymatous bleeding. The diagnosis is not easy. Only in 6 of the patients mentioned in the tables was the diagnosis correctly made. It was confused with fractures of the ribs, and necrosis of the pancreas.

The only intervention in question is splenectomy. With longer intervals between the accident and rupture of the spleen the determination of the question of their relationship may be difficult. The loss of the spleen alone does not entail a diminution of earning power.

In conclusion, the author presents a collection of the cases of hemorrhage from splenic cysts reported in the literature. (RATHCKE) LOUIS NEUWELT, M.D.

La Manna, S., and Spinelli, A. A Contribution to Our Knowledge of the Surgical Diseases of the Spleen. Grave Anemic Syndrome Due to Diffuse Hemolymphangio-Endothelioma of the Spleen with Total Disappearance of the Splenic Parenchyma (Contributo alla conoscenza delle splenopatie chirurgiche. Grave sindrome anemica da emolinfangoendoteloma diffuso della milza con sostituzione totale del parenchima splenico). *Tumori* 1940, 26: 204.

The authors describe an extremely rare case of endothelial proliferation in the lymphatics and blood vessels of the spleen which had invaded the whole organ in a man, aged forty-nine years. The patient died on the third day after an attempted splenec-

tomy which had to be abandoned because of the impossibility of liberating the adhesions with any degree of safety.

The spleen measured 27 by 20 by 16 cm. and weighed 1,800 gm. Its capsule presented extensive thickened zones of cartilaginous consistency and grayish white color, the surface of its section was dark red, rich in blood, and showed numerous irregular white grayish zones of hard, irregularly calcified, cicatricial aspect, and of varying size, its parenchyma was unrecognizable, its artery and vein were patent. Although the cells of the tumor had invaded the entire organ, they did not show signs of malignancy; they had the aspect of well differentiated, mature cells, lining the hematic and lymphatic cavities, without forming the solid cellular agglomerations of undifferentiated tumors, carcinosis was rare. The capsule was not invaded by the neoplasm, and there were no metastases. The tumor was an endothelioma that had originated from both the blood and lymph vessels, it was diffuse and had undoubtedly started at the same time from all of the vessels, destroying the entire tissue of the spleen, of which only rare follicles were left here and there. The patient undoubtedly had an endothelial oncological taint because the tendency to tumoral proliferation of the endothelium was observed in other parts of the body, such as the liver and the bone marrow, even if it was only suggested in these organs. The peripheral distribution of the lymphangiomatic zones confirmed the concept of the majority of the anatomists who deny the presence of lymph vessels in the pulp of the spleen and claim that they run exclusively in the capsule of the organ. The lymphangiomatic zones were in intimate contact with the capsule and were not found in the internal parts of the organ.

The clinical course of the disease presented some peculiarities worthy of attention. The patient had no familial or personal antecedents, but at the age of forty-five developed a feeling of weight in the left hypochondrium with some asthenia and loss of weight. A diagnosis of primary splenomegaly was made at that time, he had oligocythemia with signs of impaired blood-cell regeneration. His condition remained unchanged for five years. On admission, he was decidedly cachectic, his spleen was of about the same size as five years previously, his blood count showed 1,100,000 red cells with a globular value of 0.63, and 5,000 white cells, and he had a marked decrease in globular resistance especially in the values corresponding to the minimal resistance. Blood transfusion and iron treatment by mouth improved his general condition rapidly, but the splenomegaly increased. Various diseases were excluded and the differential diagnosis was limited to primary tumor or tuberculosis of the spleen, or the splenomegaly hemolytic anemic syndrome. The latter appeared the most plausible at the time, but prolonged observation of the patient imposed the exclusion of this syndrome. Whatever was the diagnosis, surgical intervention seemed indicated.

The neoplasm in its chronic evolution with histologically benign character was evidently responsible for the grave anemic condition as the result of a double mechanism partly to its myelo inhibitory and partly hemolytic. It would seem that the tumor had actually produced a physiopathological mechanism having the character of hypersplenism.

RICHARD KEMEL M.D.

Pignatelli G. Researches on Patients Splenectomized Because of Trauma (Altre ricerche sugli operati di splenectomia per trauma). *Chir. ital.* 1940 16 707

The chief activity of the spleen is in relation to its hematic functions which are according to Silvestrini lymphocytopoietic erythropoietic erythrolytic leucocytolytic and endocrine. The author studied a group of 5 patients splenectomized for trauma from the standpoint of their blood and blood pressure. As concerns erythropoiesis the author presents the conflicting views of various authors on this subject. He notes that in the early days of extra-uterine life the spleen is chiefly erythropoietic in function but later it assumes more of an erythrolytic function. Most authors agree that after splenectomy there is a diminution of the blood cell count which returns to normal after five or six months. The coagulation time has not been altered

after splenectomy. In experimentally splenectomized animals a diminution of the leucocytes has been noticed.

The author presents the results of his studies on 5 clinical cases in which splenectomy was done because of trauma. He found that the hemoglobin value dropped shortly after splenectomy but returned to normal about forty days after the operation and was still normal nineteen months after ward. The erythrocyte count was low at first but returned to normal after the sixth month. The resistance of the erythrocytes (to hemolysis) was increased after splenectomy and reached the highest values after the first year. The leucocytes were slightly diminished after splenectomy but increased after thirty days to reach normal values after six months. In the differential hemogram the neutrophils were at first increased; after thirty days there were a lymphocytosis and a monocytosis. The findings were normal after from six months to a year. In 2 children hypertrophy of the cervical and axillary lymph nodes was noted.

The author then noted the numerous factors which affect the blood pressure. In the present group of patients he found no noteworthy difference between the splenectomized and the normal as far as blood pressure was concerned.

JACOB E. KLEIN M.D.

GYNECOLOGY

UTERUS

Smith, F R Nationality and Carcinoma of the Cervix *Am J Obst & Gynec*, 1941, 41 424

The relatively low Jewish incidence and high Italian and Scotch-English incidence of carcinoma of the cervix was established at the Gynecological Clinic at Memorial Hospital, New York.

Various theories for these findings have been discussed but no adequate explanation has been found. The most plausible explanations deal with circumcision and other racial customs. Further studies of racial differences (in the vaginal flora) are suggested.

EDWARD L. CORNELL, M D

Cashman, B Z The Role of Deep Cauterization in the Prevention of Cancer of the Cervix *Am J Obst & Gynec*, 1941, 41 216

Chronic cervicitis seems to be a contributing factor in the causation of carcinoma of the cervix. Cancer of the cervix is insidious in onset, and because of the late stages in which it is seen today, the prevention of cervicitis, the prevention of cancer by adequate treatment of existing cervicitis, and early diagnosis of this condition by periodic examination of women over twenty-five years of age offer the best solution of the problem.

In order to destroy infection in the cervix by cauterization it is often necessary to cauterize deeply and extensively. Careful postoperative care is necessary to prevent stenosis of the cervical canal after deep cauterization. Deep cauterization of the cervix apparently was an effective method of preventing cancer in a series of 10,000 cases, for only 2 cases of cancer of the cervix are known to have occurred.

A follow-up study was carried out, but the average time interval after cauterization was only five and six-tenths years, and the average age of the patient forty years. The results, therefore, fail to show any very marked reduction in the incidence of cancer in the group because, by a new application of statistics to the series of 3,143 patients who were followed up, Levin estimates the expected incidence as only 6 deaths from cancer of the uterus in the time observed. Two deaths are known to have occurred and 1 of these was from cancer of the cervix. Deep cauterization and subtotal hysterectomy has made total hysterectomy unnecessary for benign conditions of the uterus.

EDWARD L. CORNELL, M D

ADNEXAL AND PERIUTERINE CONDITIONS

Kazancigil, T R, Laqueur, W, and Ladewig, P. Papillo-Endothelioma Ovarii, Report of 3 Cases and a Discussion of Schiller's "Mesonephroma Ovarii" *Am J Cancer*, 1940, 40 199

Recently Schiller described a group of papillomatous cystic tumors of the ovary which differed widely

from those usually encountered. He pointed out the close similarity of the greater part of the tumor elements to endothelium with "an approach to an epithelial form" only when proliferation was particularly active. He was able to demonstrate "glomerulus-like" formations, resembling closely the primitive glomeruli of the mesonephros (wolffian body), and concluded that the neoplasms originated from remnants of mesonephric tissue. The name "mesonephroma ovarii" was suggested.

Three examples of malignant ovarian tumors are reported by the authors, they presented the same general picture as Schiller's "mesonephroma ovarii". The study of these growths, however, including a plastic reconstruction of one of them, failed to reveal evidence of derivation from remnants of the primitive mesonephros. In view of the endotheliomatous character of the cells and the presence of angiomatous and angio-endotheliomatous structures, the authors believe that these tumors are rather to be regarded as angio-endotheliomatous neoplasms. The occurrence of accessory organ-specific components in 2 of the cases suggests an origin in a gonadal anlage.

A similar tumor, presumably metastatic from the testicle, was observed in the liver of a man of sixty years.

The name "papillo-endothelioma" is proposed for this group of tumors. DANIEL G. MORTON, M D

MISCELLANEOUS

Mayer, A War Injuries in Women (Ueber Kriegsschaeden der Frau) *Jkurse aerztl Fortbild*, 1940, 31 28

The author reports on war injuries in women which the World War had caused. The "war amenorrhea" has not been demonstrated so far. In many places this amounted to 8 or 9 per cent of all gynecological ailments. This frequency seems a little high when one remembers that the tabulations included all women from sixteen to forty-eight years of age, whereas it would probably have been more accurate to include only those between twenty and forty years of age. The causes of the war amenorrhea were believed to be spiritual softening or reactive depression, corporeal exhaustion from overwork, undernutrition, and vitamin deficiency. Some attributed it to ergot poisoning as a result of the increased use of bread flour, while others attributed it to sexual abstinence. The combined action of several of these factors probably plays a part in most instances. Increased genital hypoplasia was also seen more often. It is uncertain whether it was actually due to undernourishment or whether this cause was given more frequently by the profession on account of the apparent increase in the condition. After the World War an increase in sterility was ob-

served. As a somatic cause genital hypoplasia must be accepted.

An especially severe drawback was the antagonistic attitude toward conception and to a certain extent also the late marriages. In contrast there are numerous people today who seek aid for sterility. Many of the sterile women of the World War were also complaining of frigidity and lack of orgasm. One must not forget that a marriage forcibly torn asunder by the war did not always continue harmoniously after the return of the man. The simultaneous decrease in the occurrence of eclampsia attributable to the decreased consumption of protein and fats has not been observed so far today. In many locations there was also a qualitative deterioration of the newborn. During the first few years of the World War there was no appreciable underdevelopment of the child. Only during the last years did the average weight of the newborn decline from 3,400 gm. before the war to 3,330 gm. A decrease in nursing ability due to undernourishment of the mother was not observed. Nevertheless it is necessary even after a victorious war to work for the interest of the coming generation by providing the best possible nourishment and by relieving the woman from heavy man-

ual labor. At times anxious reports from the front caused temporary decrease in milk secretion. It is impossible to state definitely whether there was an increase or decrease in cancer. An increased number of inoperable cases of cancer was noticeable after the war. Whether this was due to the weakening of the cancer propaganda migration due to overwork or improper recognition by inexperienced physicians who were improperly trained during the war will have to remain undecided. The increase in hernias and genital prolapse is explained by overwork, undernourishment or both, so far it has not made its appearance. After the World War there was a enormous increase in gonorrhea, especially in the large centers among the single individuals as well as among the married. This is again being observed today. Mental or spiritual reactions may by means of psychophysical blood shifting—the so called sympathico-adrenal necessity function—or by means of other hormonal upsets lead to abortion and to many different menstrual disturbances. The shortage of physicians did not cause too much harm to patients. Serious spread of disease due to lack of physician was not observed.

(H. FUCH) LEO A. J. HALL, M.D.

Forty five hours after admission when she appeared better another attack the fourth ended in death. The autopsy showed insignificant changes in the liver and severe eclamptic nephropathy.

The fourth case was also of the cerebral type. The patient was a para in of thirty one years in the beginning of the fourth month of pregnancy. During apparent health she suffered an eclamptic attack. Stroganoff treatment was followed by spontaneous delivery of a fetus measuring 15 cm. In spite of treatment with glucose and insulin her condition grew worse. The residual nitrogen rose to 100 mgm per cent and the patient died on the third day with out regaining consciousness. The autopsy showed numerous small hemorrhages in the brain and meningitis insignificant hepatic lesions and severe nephropathy of the eclamptic type.

The author like the majority treats his eclamptic patients by middle line methods with the addition of glucose and insulin. As an illustration of the caution necessary in evaluating obstetrical statistics to prove the superiority of some form of treatment he cites the results obtained during two periods at the Kvinnoklinik at Malmo. More radical treatment was used in 27 cases of eclampsia and 11 cases of eclampsism during the period from 1937 to 1938 while conservative treatment was used in 28 cases of eclampsia and 18 cases of eclampsism from 1938 to 1939. There were no deaths in either of these series. The 4 fatal cases here reported all occurred during the first three months of 1940 under the same management and principles of treatment used from 1938 to 1939. (AXEL OLSEN) EDITH SCHANCHER MOORE

LABOR AND ITS COMPLICATIONS

Danforth D N Graham R J and Ivy A C
The Physiology of the Uterus in Labor O 1
Bull No 18 este U of Md Sch of 94 5 1

Danforth and his coworkers of the Department of Physiology and Pharmacology of Northwestern University Medical School present an article regarding the physiological processes concerned in the evacuation of the uterus. Their conclusion are based on experimental laboratory observations covering a period of ten years.

The authors discuss the anatomical and physiological divisions of the uterus describing the upper uterine segment the physiological contraction ring or Achoff's anatomical internal os the lower uterine segment and the obstetrical or physiological cervical uteri. The four major properties of the uterine musculature are explained. These are properties common to smooth muscle in general (1) contraction (2) relaxation (3) adjustment in length without change in intra uterine tension and (4) co-ordination. Detailed consideration is given to the discussion of metrorrhagia which is defined as a state in which the length of the muscle fibers is relatively fixed and at which length it contracts and relaxes. Furthermore when the muscle fibers increase or decrease in length and at the increase or decreased

length manifest the same tension as before a metrorrhagic adjustment has occurred.

The authors consider in detail how metrorrhagic adjustments occur in the uterus during the course of pregnancy and labor. They believe that a coordinating mechanism for uterine motility exists but that its exact nature is unknown.

Findings in dog and monkey uteri are described as well as the functions of the extrinsic nerves and their role in labor. WILLAR G FRENCH MD

Stuppy C P Stability Value and Limitation of Medical Treatment of Intra Uterine Asphyxia (Moeglichkeite Wert und Grenzen d m d kament es n B h d ng de nt t n m Asphyx) G b t h F a k k 194 5 8

The medical management of birth by the use of drugs acting on the circulation was introduced in the fight against intra uterine asphyxia and therefore also against intracranial hemorrhage in 330 cases during 3000 deliveries. The present article is based on the experience with 18 cases occurring among 1050 births.

First are discussed 21 cases of the eaten gasphyria during the stage of dilatation. Two cubic centimeters of cormed were given intravenously and 3 ccm were given intramuscularly to serve as a depot or 1 ccm of cardiazol was administered. About thirty seconds after the intravenous injection an impressive improvement was observed in the heart sounds of the child and the action of the drug usually lasted several hours the injection was repeated when the effect disappeared. Among these 21 cases spontaneous birth occurred in 14 and forceps delivery was necessary in 7 among the former 1 child died from rupture of the placenta.

An intravenous injection of 17 ccm of cormed or 1 ccm of cardiazol was given in 51 parturients among because of threatening asphyxia during the stage of expulsion and all necessary preparation for forceps delivery were made at the same time. It was often necessary to repeat the injection into the vein of the elbow after from fifteen to twenty minutes. In some cases a dose of 0.5 ccm of the drug was injected directly into the scalp of the child. Spontaneous birth of a viable child occurred in 33 cases while in the 18 others the action of the cardiazol drug was only temporary and recourse had to be made to forceps delivery. Funarcon or evipan was mostly used for the anesthesia and was added to the cormed or cardiazol.

In cases of presentation of the pelvis the injection was given partly for asphyxia and partly as a prophylactic measure. In 8 of 34 of these births administration of the cardiazol drug was necessary because of aggravation of the heart sounds of the child during the stage of dilatation and in the stage of expulsion spontaneous birth could be waited for in 5 cases and the fetus had to be extracted in 3. 1 child died from intracranial hemorrhage.

The injection of cormed is recommended on principle in all cases in which manual help is indicated.

because it allows the necessary time to work in peace. Good results were obtained in asphyxial conditions during the stages of dilatation and adaptation in 42 cases of slight spatial malrelation between the head and pelvis, a living child was born spontaneously in 23 cases, while 1 child was born in an asphyxial condition and died two days after birth because of cranial trauma.

The administration of cardiac drugs is also recommended in cases of presentation of the face, of protracted labor, and of predisposition to intra-uterine asphyxia (transmission).

In his summary, the author states that the child mortality in the reported 1,050 deliveries was 0.76 per cent, and the frequency of intervention 14.76 per cent. (HANS HEIDLER) RICHARD KEMEL, M.D.

PUERPERIUM AND ITS COMPLICATIONS

Defendi, S. The Behavior of Serum Polypeptides in the Puerperal State (Il comportamento dei polipeptidi nel siero di sangue nello stato puerperale) *Folia demograph gynaec*, 1940, 37, 371.

The author summarizes current opinions on the metabolism of proteins, of which the polypeptides are intermediary products. The latter are derived by catabolism from the endogenous body proteins, and by synthesis from amino acids released from the tissues or absorbed through the intestine. Their concentration in the blood is regulated by a triple mechanism: elimination, chiefly as such, by way of the urine, in which they are found in a concentration of 7 mgm. per liter, breaking down into amino acids, or conversion by the liver into urea. Elevation of the serum polypeptides occurs in association with various pathological conditions including alcoholic psychoses, dementia paralytica, encephalomalacia, leukemia, tuberculosis, peptic ulcer, severe trauma, neoplasms, and x-ray burns.

Reports of serum polypeptides in pregnancy are not in agreement, certain workers having found a progressive increase in the blood level and others a double peak, while certain groups have demonstrated a decrease. The complications of pregnancy have met with similar variance of opinion, and causes have been sought in humoral agents as well as in failure of the liver in protein metabolism.

Defendi has directed his attention chiefly to normal pregnancy and to the puerperium. Six cases are reported in each month of gestation, with an equal number for each of the first eight postpartum days. Fifteen non-pregnant women were studied as controls, the average blood polypeptide values of whom were found to be 25 mgm. per cent. In addition, 8 cases of hyperemesis, 25 of low-grade albuminuria, 20 of moderate albuminuria, 14 of eclampsia, and 9 of nephritis complicating pregnancy are tabulated.

Polypeptide values in normal pregnancy were found to increase gradually from the control level at the second month to 49.8 mgm. per cent at term, with a further increase to 53.1 during labor. The

normal puerperium also showed an increase from 45 mgm. per cent on the first day to 54 mgm. on the fifth, followed by a rapid decrease to normal limits in the subsequent two days. In the pathological groups, patients suffering from hyperemesis were found to have a blood level of 41 mgm. per cent. Those manifesting albuminuria had from 49.8 to 69.4 mgm. per cent, the amount depending upon the severity of the condition. The eclamptic group of patients averaged 99 mgm. and those with nephritis complicating pregnancy 78 mgm.

In commenting upon the results of these experiments the author points out that the pure nephritic condition shows no increase in polypeptides, whereas nephritis demonstrates a radical increase and suggests the usefulness of the determination in differentiating border-line cases. Notable also is the so-called deamination index $\frac{\text{polypeptide nitrogen}}{\text{total non-protein nitrogen}}$.

which in renal disease as well as in the normal varies between 0.8 and 0.12. In hepatic insufficiency, on the other hand, the polypeptides alone are elevated and the deamination index tends to rise to 0.50 in severe conditions. The variable values obtained in toxemias of different types are interpreted, therefore, as indicating the presence or absence of hepatic involvement.

Basing his choice upon the well known work of Brown-Séquard on the endocrine functions of the kidney, the author treated his patients with a renal extract "nefrobiol" and the sodium salt of dihydrocholic acid, "decholin." Several cases are reported in each of the groups defined, in which improvement is noted. EDITH FARNSWORTH, M.D.

Froewis, J. The Bacterial Content of the Uterine Cavity During Confinement (Zur Frage des Keimgehaltes der Gebärmutterhöhle im Wochenbett) *Zentralbl f Gynaek*, 1940, p. 1393.

The subject matter of this article is concerned with the still predominating view of Loeser that the uterus is free of bacteria on the first day after delivery, but on the second day bacteria are present in 25 per cent of the cases, on the third day they are present in 75 per cent, and on the fourth day in 100 per cent. The bacteria travel from the vagina into the uterine cavity. Besides Doederlein, the Russian authors, since 1935, have contradicted these views, and in 1938 Tscherne presented final disproof. The present work was conducted along the lines followed by Tscherne and the Russian authors. On 60 afebrile and 30 febrile lying-in women the following studies were done.

Bacteriological cultures were taken from the uterus with sterile lochia probes, and venous blood cultures and direct control smears were made. The cultures of the lochia were directly implanted into one Schottmueller plate, 1 Voges plate, 1 endo plate, 1 dextrose broth, and 1 liver broth. The results were tabulated.

In 38 of the 60 afebrile women there were no micro-organisms, but in 22 bacteria were found,

predominantly *Cramposi* e *cocci*. A positive finding was distinct phagocytosis. In 40 of the 47 female women the bacteriological cultures were negative and in 11 the following bacteria were found: the *staphylococcus albus* in 6 cases, the *diphtheria bacillus* in 2 cases, the *diplococcus lanceolatus* in 1 case and the *hemolytic streptococcus* in 1 case. The cultures were taken in the 47 female women from the second to the eighth day. The negative cultures of some cases which contained organisms on direct smear demonstrate destruction of the bacteria. The uterine cavity is practically sterile in normal confinement. (NORTHBRITT) FRANK McDONELL, M.D.

Pitkanen H. Operative Correction of Uterine Displacements and Results in the University Clinic for Women at Helsinki in the Years from 1930 to 1937 (Leber der Redressur der Gebärmutter und ihre Ergebnisse der Universitäts-Frauenklinik zu Helsinki in den Jahren 1930-1937). *Acta Soc. med. Fenn. D.* 1938, 940 B 29 Fasc. p. 93.

The author reports 641 operations for correction of uterine displacements of which 109 were performed for complicated movable retrodisplacements, 103 for fixed retrodisplacements, 137 for retrodisplacements and 170 to secure replacement in the course of other operations. The most frequently employed method was the Crozer-Gilliam-Warren-Wichmann procedure which is similar to the procedure of Deloris but circumvents the danger of intestinal incarceration. It involves passing a special instrument obliquely through the rectus muscle and carrying the point of the instrument externally to the peritoneum and fascia transversalis to the region of the internal inguinal ring. There the peritoneum is opened, the round ligament is ligated and cut as far distal as possible and to avoid breaking the tube is separated a short distance from the broad ligament. The resulting peritoneal defect in the broad ligament is closed by suture, the round ligament is drawn through the inguinal ring and is fixed to the peritoneum. It is then sutured to the ligament of the opposite side over the rectus muscles.

The author was able to trace 80 cases of operative replacement and found especially good results anatomical as well as functional with the described method. The anatomical result was poor in only 7 (3.4 per cent) of 203 procedures of this type. Sixteen of the traced patients had successfully made the very day after the operation and of the 6 had hitherto been sterile.

(TSCHERL) JOHN L. LUDWIG, M.D.

NEWBORN

Valle C. Experimental Study of a Respirator of the Drinker-Murphy Type for the Reanimation of Asphyxiated Infants (Contributions to the study of respiration). *Acta Soc. med. Fenn. D.* 1938, 940 B 29 Fasc. p. 93.

The author describes the Drinker-Murphy respiratory apparatus and gives references to the American

literature in regard to it. It is essentially a metal chamber with the head protruding into the ordinary room and through a rubber collar. The air pressure inside the chamber is regulated so as to cause a slight degree of negative pressure which succeds the atmospheric pressure rhythmically. When the thorax and abdomen of the chamber are subjected to negative pressure the atmospheric air aspirated into the lungs through the nose, mouth and trachea and the thorax expands. When the pressure inside of the chamber is returned to normal elastic retraction inside the thorax causes expiration.

The author describes experiments made to determine the efficiency of respiration on inside the respirator to determine what pressures are most effective and which ones cause anatomical lesions or disturbances of function and what pressures oxygenate the fetal blood most rapidly without doing any injury to the asphyxiated infant.

The apparatus was found to be effective at negative and positive pressures of a few centimeters of water sufficed to establish a current of atmospheric air in the lungs. Animals that had been paralyzed deeply anesthetized so that respiratory paralysis was so great as to kill untreated animals were kept alive in the respirator for the whole time that the action of the toxin lasted and were able to resume their normal activities after the toxin was eliminated.

The respirator may do harm if too high pressures are used. Experiments on curried or deeply anesthetized rabbits showed that a negative pressure of 35 cm. and a positive one of 25 cm. of water produced localized emphysematous ones especially along the edges of the lungs. There were no other macroscopic or microscopic lesions in any of the other organs and even when the treatment was prolonged for twenty-four or forty-eight hours the animal seemed to bear this type of artificial respiration very well. When these pressures were exercised on the bodies of children who had died during labor or within the first twenty-four hours after birth hemorrhagic areas were frequently seen in the lungs accompanied by zones of atelectasis in addition to the emphysema along the margins. Autopsies in these cases showed plugs of mucus obstructing the bronchi. Experiments showed that these areas were caused by the respiration of mucus or saliva in the upper respiratory passages and that they were rarely produced when the upper respiratory tract was cleared and free.

Experiments were made to determine not only the limits of safety but also the best pressures to reanimate the bulbous centers of respiration most quickly. It was found that gas exchange was maintained perfectly and an excellent success of respiratory movements was brought about by a negative pressure of 10 cm. of water and a positive pressure of 8 cm. but that just as good results were obtained simply with the negative pressure of 10 cm. however in cases of partial asphyxia the author thinks that the use of a slight positive pressure also is sufficient.

As to the frequency of respirations he found that in newborn infants from 30 to 40 respiratory move-

ments per minute was best. With regard to the best mixture of gas to be used, he found that the respiratory movements in animals in which the bulbar centers had been paralyzed were restored most quickly by the use of atmospheric air first and then inhalations of pure oxygen, which were followed by inhalations of carbon dioxide.

For premature infants the temperature inside of the chamber should be kept at 37° C so that the body of the child can be kept warm while he can breathe the moister and cooler atmospheric air. The respiratory chamber can also be used as an incubator so that respiration can be begun promptly if the child becomes cyanotic, as frequently happens. It seems that the chamber also has a good effect on intracranial pressure, as it decreases the pressure in the veins and that of the spinal fluid, and favors the return of the blood to the heart.

An absolute contraindication to the use of this respirator, as well as of other methods of artificial respiration, is obstruction of the air passages. The greatest care should be taken to remove any mechanical obstruction in the nose, retropharynx, or larynx. If the trachea or bronchi are obstructed they should be freed of mucus by laryngoscopy. After the mucus is removed the apparatus should be placed in the Trendelenburg position as it has been found that with an inclination of 20° and a negative pressure of only 10 cm of water, aspiration cannot overcome the force of gravity and draw into the lungs any liquid that may be in the upper respiratory tract.

AUDREY G. MORGAN, M.D.

MISCELLANEOUS

McSweeney, D. J., and Moloney, A. M. X-Ray Pelvimetry for General Use. *New England J. Med.*, 1940, 223: 1043.

Experience at the Boston City Hospital during the last three years has convinced the authors that their technique, which is based on the method originated by Ball, is simple, inexpensive, informative, and practicable for general use. This technique requires no expensive equipment, a simple anteroposterior and a true lateral film being sufficient. Details of the method are given.

An attempt is made to visualize the birth canal as a whole, with all its various important diameters and contours and their conformity to the size, direction, and shape of the fetal head that is offered for delivery. The study included in this report concerned the routine measuring of 200 unselected primiparas and a correlation of the findings.

A classification of pelvis was used which combines those of Thoms and of Caldwell and Moloy, and is based on both measurements and pelvic configuration. The various types are the gynecoid or female pelvis, the round pelvis, the android or male pelvis, the anthropoid pelvis, the platypelloid or flat pelvis, and the asymmetrical pelvis. The incidence of the various types was gynecoid, 65 per cent, round, 20 per cent, android, 7 per cent, flat, 4.5 per cent,

anthropoid, 3 per cent, and asymmetrical, 5 per cent.

External measurements, which were taken routinely on all cases, proved of but slight value in diagnosing the type of pelvis or in ascertaining the correct anteroposterior diameter of the inlet. In only 20 per cent of the cases was the conjugate vera, as determined from the measurement of the external conjugate, within 0.5 cm. of the measurement by x-ray, and in some cases there was a discrepancy of 4 cm. or more.

The anteroposterior diameters of the inlet (conjugate vera) varied from 7 to 13.6 cm., 60 per cent being 11 cm. or more and 31 per cent being from 10 to 11 cm. All the cases with a conjugate vera of 9.5 cm. or more (97 per cent) were delivered from below. Of the cases under 9.5 cm., 3 were delivered by cesarean section, 1 by mid-forceps, and 2 by normal delivery.

The pelvis with narrow conjugate veras are usually of the flat or justumior type. The android type offers the greatest difficulty in management because of the reduced capacity available for engagement of the fetal head, due to the angulation of the fore-pelvis.

The bispinous diameter, which constitutes the narrowest diameter of the mid-pelvis, varied in the authors' series from 7.6 to 12.5 cm., the majority being 10 cm. or over. Assuming a diameter of 9.5 cm. to be adequate even for posterior heads, 81 per cent of the cases were in this category.

The posterior sagittal diameter of the mid-pelvis varied from 2.4 to 6.2 cm. Eighty-six per cent of the cases were 3.5 cm. or over. For all practical purposes, the posterior sagittal diameter, to be adequate for rotation, should measure at least one-third of the bispinous diameter.

The perpendicular length of the fore-pelvis varied from 6.5 to 10.8 cm. The large majority of cases (73 per cent) measured 9.5 cm. or less, which left 27 per cent as potentially funnel in type. The minority usually accompanied the pelvis with an android or anthropoid tendency.

Neither the duration of labor nor the probability of operative delivery can be anticipated by consideration of the pelvis alone, because of the variability of the other factors involved. X-ray measurements are but a part of the general picture, such as the contour of the inlet, the angulation of the fore-pelvis, the flattening of the posterior pelvis, the resistance offered by the cervix, the degree of flexion and moldability of the head, and the strength of the uterine contractions.

The authors believe that x-ray pelvimetry is indicated in the following cases: primiparas with floating heads at term, multiparas with a history of previous difficult deliveries, primiparous breech positions with apparently small pelvis by external measurements, women with narrow subpubic arches and outlets, and elderly primiparas with external conjugates of 18.5 cm. or less.

DANIEL G. MORTON, M.D.

Schultze K. W. Anomalies Among Abortions
 Their Origin and Clinical Significance (Ueber
 Missbildungen bei Aborten ihre Ursache und
 klinische Bedeutung) *Ztsch f Geb fsh* 1940
 21 24

The author begins by stressing the political and national significance of abortions. Of about 220,000 abortions Philipp has estimated that 100,000 were induced. The causes of the spontaneous abortions were divided by the author into those of maternal origin and those which were dependent upon disease of the ovum itself. Of 120 abortions 49 per cent were due to severe common illnesses and local pathological conditions of the genitalia. Insufficient corpus luteum hormone formation was responsible in 40 cases. Seventeen per cent of the patients were shown to have anomalies of the fetus, fatal torsion of the cord, hydatidiform mole or hydramnion. The etiology was not clear in 27 per cent.

The author then discusses the status of the vitamin and hormone depots as a cause of abortion. Anomalies play a very important role in the causation of abortions, although formerly it was unrecognized. The germ plasma genesis of anomalies on the basis of transmitted lethal factors is completely discussed in detail. It is sometimes a factor in animals. In 12 pregnant rats with 139 yellow corpora there were 60 dead fetuses in 70 per cent and stunted fetuses in 20 per cent. In 10 per cent anlagen could no longer be seen. The findings were demonstrated with tables and illustrations. The appearance of the

lethal factors in man seems affirmed in the literature. It explains somewhat the numerous overweight human fetuses in spontaneous abortions and the relative frequency of aborted ova.

The formation and structure of the aborted ova are next described. The work of H. S. Mall and Velpeau is shown and critically described. The author believes with this that about 26 per cent of all fertilized ova degenerate before birth. Clinical macroscopic and histological descriptions of several aborted ova are appended. Windecker says that deformities of the fetus, placenta or of both may result. The heredity of the lethal factors is considered the result of erythroblastosis. The anomalies in the causation of abortion demand an accurate study of the placenta, especially if no miscarried embryo is observed. The author estimates the number of abortions of this origin to be about 100,000 or for every 13 living births there is 1 abortion due to lethal factors. If one takes the figures of Philipp as a basis, half of the abortions are of this type. The author himself found these factors responsible in 23 per cent of 88 evacuated abortions. The determination of the cause of abortions in this category is of importance in criminal procedure; it shows the doctor and judge in which cases natural causes are responsible. An example is given in which the proof of an aborted ovum invalidated the suspicion of an intentional abortion. After this it seems impossible to lower the birth/miscarriage ratio below 13/1.

(ROSENKRANZ) FRANK McDOWELL M.D.

GENITO-URINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Majane, A I Immediate and Later Results, and the Prognosis in Newgrowths of the Kidney (Sofortige und spätere Folgen und Prognose bei Neubildungen der Niere) *Urologia*, 1940, 17 32

The clinical material consisted of 86 cases, predominantly 75 of tumor of the kidney parenchyma, whereof 20 proved on admittance, or at least at operation, to be inoperable. Sixty-five cases were operated upon radically, with removal of the kidney when possible. Nine of the patients (15 per cent) died immediately in connection with the operation, 4 within the following month, and 22 following dismissal from the clinic, the most of them within one or two years following the operation.

The period of remission of those operated upon was estimated by the author at 43.8 per cent for three years, and 42.9 per cent for five years, the figures given were not very definite for a longer period. Eight patients who were operable refused the operation, of these 2 were still living, one three and one-half months and the other one year and six months later. Ten inoperable and non-operated patients exhibited, nevertheless, an average duration of life of four and eight-tenths months, and 7 patients who were operated upon despite the inoperability of their condition survived seven and eight-tenths months.

Evaluation of the clinical material leads the author to the following conclusions:

1. Should the patient, following operation, live for three years, the prognosis becomes more favorable. After five years he may be practically regarded as cured, however, recurrences still develop after more than five years.

2. The period of time which elapses before the patient comes under medical treatment is not proportional to the severity of the subsequent course.

3. Advanced age, the presence of areas of broken-down tissue within the tumor, rupture of the tumor into the neighboring veins, dilatation of the veins of the capsule, the presence of metastases in the lungs and spleen, accelerated sedimentation rate of the blood, and fever are prognostically unfavorable.

4. The size of the tumor does not of itself determine the inoperability. Indications for operation should be placed as widely as possible, since without operation the fate of the patient is sealed in almost every case.

(SCHOBER) JOHN W BRENNAN, M D

GENITAL ORGANS

Catalano, G Experimental Hypertrophy of the Prostate (Ipertrofia prostatica sperimentale) *Clin chir*, 1940, 16 477

Many theories have been advanced to explain hypertrophy of the prostate in man. The most

probable one seems to be that of the influence of hormones.

The author describes his experimental work on young dogs from forty to sixty days old. He selected these animals because their prostates most nearly resemble that of man and they seem to suffer spontaneously from a hypertrophy of the gland similar to that in man. He used 16 puppies, 13 of them treated and 3 as controls, and gave them injections of folliculin or testosterone or of the two combined.

From the macroscopic findings he reaches the following conclusions:

The administration of female hormone causes a considerable increase in the size of the prostate with marked hypertrophy of the walls of the bladder. The male hormone causes the same changes but to a lesser degree. The administration of both hormones together does not prevent the increase in size of the prostate or the disturbances caused by it.

Clinically, the giving of folliculin to young dogs causes a picture similar to that seen in the spontaneous hypertrophy of the prostate which sometimes occurs in these animals in the second or third year of life. If the folliculin treatment is stopped the urinary disturbances decrease or even disappear entirely and the general condition of the animals improves quite rapidly. However, the size of the prostate and the thickness of the walls of the bladder do not decrease even five months after the cessation of treatment.

Changes in the size and weight of the testicles, on the contrary, show that the alterations caused in these organs by folliculin are readily reversible. It will not be possible, until a microscopic examination of the organs has been made, to determine the mechanism of this hormonal action on the accessory sexual glands, what parts of them are most affected, and what are the possible relations to hypertrophy of the prostate in man.

ADDREY G MORGAN, M D

MISCELLANEOUS

Santoian, G, and Caputo, L The Treatment of Gonorrhea with the Sulfapyridine Preparations—M B 693 (La cura della blenorragia con i composti sulfamido-piridinici (tipo M B 693)) *Riforma med*, 1940, 56 1221

The sulfamide group of products have aroused an intense interest in the therapeutic field and in general have been widely adopted in the treatment of gonorrhea. A considerable advancement was obtained with the adoption of a pyridine derivative of sulfamide (pyridine amidophenol sulfamide), generally indicated as M B 693. Sulfapyridine is a white crystalline substance without odor or taste, its melting point is 191°C. It is soluble in water at 20°C in a 0.03 per cent solution, and in alcohol at 95°C in a 0.25 per cent solution.

This product is more effective than any other of this group. The gonococcus disappears in from two to five days after the administration of sulfapyridine in 90 or even 100 per cent of the treated cases. The sulfamidic products administered per os are very easily absorbed and this process may be accelerated and intensified by the addition of sodium bicarbonate. Nearly complete elimination is achieved in two or three days. After the administration per os of the sulfapyridine (12 gm. in six days in decreasing doses) there is a mechanism of action which according to Durel may be expressed as follows: (1) stimulation of the normal protective action of the organism (phagocytosis), (2) decrease of the vitality of the bacillus which is destroyed in successive stages by the defensive powers of the organism and (3) change into a bactericidal product. Many cases of failure are due to the administration of insufficient initial doses of sulfapyridine, to too early interruption of the treatment or to an irregular posology in the daily doses. It is particularly necessary to administer large initial doses in order to obtain a rapid and high concentration of the medicament in the blood and thus initiate the bactericidal action which can be maintained for from six to nine days in spite of decreasing doses of the drug. It is useless to continue

the treatment if the efficacy of the product does not appear within a few weeks. If there is a unfavorable reaction the administration of the drug should be discontinued at once. The doses generally used are 6 tablets (3 gm.) on the first and second days, 4 tablets on the third and fourth days and 2 tablets on the fifth and sixth days, i.e. a total of 12 gm.

In some cases of acute urethritis the disappearance of the gonococcus occurred as early as ten hours after the ingestion of sulfapyridine. Satisfactory results have been obtained in acute and subacute gonococcal urethritis as well as in chronic cases. The best results were observed in cases of epididymitis, deferentitis and prostatitis with complete regression of all the clinical symptoms, both objective and subjective in a very short time. In acute total subacute and chronic urethritis the administration of sulfapyridine together with local treatment was remarkably successful, healing being obtained in 100 per cent of the cases. In anterior recent urethritis healing is also rapid with the use of only sulfapyridine. Since sulfapyridine is efficient in doses smaller than those of the pure sulfamidic products usually administered in such cases, the poisonous effects of the drug are slighter and treatment is safer.

MELBA CASSUTO

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC

Canavero, M., and Maggi, E. Osteomyelitis from Anaerobic Pathogenic Micro-Organisms (Osteomielite da germi anaerobi patogeni) *Polidattin*, Rome, 1941, 48 sez chir 1

In the last ten years chronic suppurative bone lesions were carefully studied both from the clinical and bacteriological points of view. There were some which were caused by anaerobic micro-organisms.

Uffreduzzi and Fasiani verify the association of aerobic and anaerobic bacilli in some cases of necrotic suppurative osteomyelitis. Agrifoglio obtained in rabbits some cases of osteomyelitic lesions which consisted of small cell infiltrations of the marrow and caseous necrosis of the diaphysis and epiphysis. Experiments carried out on other animals have not given the same results. This discordance may be due to the fact that although it is possible to regulate the experimental infection and to keep it monomicrobial, the manifestations are often due to various species of bacteria. Fiori believes that together with highly pathogenic and virulent anaerobes, there are other bacteria which are innocuous for the organism or capable of only indirect pathological effects.

The first are the agents of the gas infections, the others often destroy the tissues. This conception does not coincide with those who think that the bacteria of the gas infections are habitual saprophytes, capable of becoming virulent under favorable conditions.

It is necessary to divide the gaseous forms into two categories: classic gas-edema infections and infections with putrid associations. To the first group belong the gas infections caused by pathogenic bacilli, to the second the infections caused by aerobes associated with putrefactive bacteria, aerobes, or anaerobes.

The authors have made some researches on rabbits to study the bone and medullar lesions established by anaerobic pathogenic micro-organisms, isolated as well as in poly-microbial association. The bacterium used was the bacillus perfringens. The results were as follows:

1 The intravenous injection of the bacillus perfringens in young animals did not cause suppurative or necrotic lesions.

2 The intravenous injection of pathogenic anaerobes synchronously with, or followed by, trauma to the bone surface caused an edema in the injured limb and characteristic osteomyelitic lesions.

3 The pathogenic micro-organism (virulent edema bacillus, bacillus perfringens) caused osteomyelitic lesions such as the typical edemogaseous forms.

4 With small doses of the culture the bacilli were latent in the bone tissue. Trauma may make them virulent.

5 The intravenous injection of pathogenic anaerobic bacteria (bacillus perfringens) together with staphylococcus pyogenes may cause a gangrenous infection in the human body.

6 An osteomyelitis with gaseous necrosis as in gaseous gangrenous osteomyelitis of the human body was produced following a trauma after the injection of the bacteria. NELDA CASSUTO

Bado, J. L., and Larghero Ibarz, P. Osteoid Osteoma of Jaffe. Comments on 2 Personal Cases (A propósito del osteoma osteoide de Jaffe. Comentario de dos observaciones personales). *Rev. brasil de orthop e traumatol*, 1941, 2 139

The authors report 2 cases of osteoid osteoma of Jaffe in men aged twenty-one years. In the first, the anomaly had developed at the internusuperior angle of the astragalus, and in the second in the tibial epiphysis at the base of the internal malleolus. Both patients were operated upon with good results. The observations made in these 2 cases show that Jaffe's designation of osteoid osteoma is in accordance with the histological aspect of the lesion, which must be considered as a benign tumor having individual characteristics that justify its acceptance as a separate morbid entity.

The lesion is usually found in adolescents and young adults from eleven to twenty-five years of age, and less frequently in children or adults up to thirty-five years; it may appear in any bone, but localization in the ribs and the skull has not yet been observed; the large bones of the lower extremity are mostly involved. The principal symptom is pain, its appearance and persistence induce the patient to seek medical advice, but as a rule the patient has been suffering for a long time before he comes under observation in the first reported case it was five years, and in the second fifteen months. In the beginning, the pain is dull and inconstant, later it becomes more intense while remaining inconstant; at times, it occurs in nightly crises, at times with exacerbations without apparent cause and at times in connection with prolonged exercise; it does not respond to rest, in some cases, it is relieved for a few hours by salicylates, in others even morphine is ineffective during the crisis. When the lesion occurs in the vicinity of a joint, there may be limitation of movements, fatigue, and a feeling of weakness in the joint, physical examination may show slight swelling and local increase in temperature, while palpation may cause great increase in pain. There is muscular atrophy, but no adenopathy, fever, or history of previous traumatism.

Roentgen examination is decisive for those who are familiar with the characteristics of the lesion, but the picture might be confused with that of chronic osteomyelitis. Various anatomico-roentgenological forms are observed.

1 A small area of round and perfectly delimited rarefaction. During the first stages of evolution the lesion appears as a small transparent round or slightly oval spot having a diameter of 1 cm or less when the lesion is located in the metaphyseal spongiosa of the long bones the zone of rarefaction is surrounded by a darker ring of varying thickness which represents the reactionary response of the bone tissue this ring is larger when the lesion occurs in the cortex of a long bone

2 A round sequestrum. When the tumor is more advanced in its evolution calcification and ossification occur beginning irregularly in the center under the form of small zones separated by still uncalcified small spaces. At times the calcification has the aspect of a small uniform central nucleus surrounded by a transparent halo and then a more opaque zone which separates the lesion from the healthy bone

3 A hypercondensed form which is found when the tumor develops in the cortex of a long bone. At times it is difficult or impossible to distinguish the lesion from the neighboring thickened cortical tissue but it may often be demonstrated by prolonging the exposure or making exposures in varying plane. Jaffe has stated that these images are frequently mistaken for lesions of chronic sclerosing osteomyelitis of syphilitic nature

4 An exostotic form. When the lesion begins immediately under the periosteum the neighboring cortex reacts and becomes thicker and condensed and the lesion is not incorporated into the cortex from which it remains separated by a few layers of bone tissue. The lesion then takes the special aspect of an exostotic parosteal tumor with which it may be confused because of the absence of pain. Only one case of this kind has been observed by Jaffe in a phalanx. He attributes the lack of pain to the absence of compression as the subperiosteal localization of the tumor allows it to expand freely.

The only treatment is surgical extirpation which should be radical. The lesion shows no tendency to recur. Its etiology is unknown.

RICHARD KEMEL, M.D.

Batts M. Jr. Periosteal Fibrosarcoma. *Arch. Surg.* 1941 43: 566

Twenty seven cases of periosteal fibrosarcoma were selected from a series of 200 primary malignant bone tumors comprising osteogenic sarcoma, Ewing's sarcoma and multiple myeloma. The diagnosis was made on the basis of a combination of clinical, operative, roentgenological and histological observations.

Seventy eight per cent of all the patients were under forty years of age and 50 per cent were in the second and third decades of life. Sixty three per cent were males. In 37 per cent there was a history of trauma. From the analysis it is assumed that trauma probably does not play an important role in the development of periosteal fibrosarcoma. The average duration of the symptoms was twenty

months. The outstanding symptoms were pain and swelling. The pain was usually not severe, sometimes intermittent and often worse at night.

The tumor was deep-seated, smooth and without fixation to the overlying tissues. It could be distinguished from lesions in the soft parts by its limited mobility due to its deep attachment to the periosteum. The tumor was usually firm and only moderately tender. There was no dilatation of the superficial vessels. There was limitation of motion when the tumor was near an adjacent joint. Without exception the lesions were single. The most common sites were the ulna and femur. The upper extremity was involved in 30 per cent and the lower extremity in 37 per cent of the cases. The skull in 16 per cent and the spine in 7 per cent. The lesions of the long bones showed a predilection for the end of the bone, the distal end being the one usually involved.

The roentgen characteristics were of two main types: destructive and reactive. The destructive type showed a relatively large soft tissue tumor overlying an area of erosion in the cortex. The eroded area was usually smooth and involved one side of the shaft. In the reactive type the only roentgen signs were thickening and roughening of the underlying cortex with little or no bone destruction.

The gross pathology showed the lesions at operation to be firm, generally encapsulated and white and glistening on cut section. In cases of bone destroying lesions there was a disappearance of the underlying cortex with invasion of the medullary cavity. In those cases showing reactive osseous changes there was frequently a sharp line of demarcation between the substance of the tumor and the underlying roughened cortex. In these cases the tumor could be shelled out with ease.

The microscopic features of periosteal fibrosarcoma were essentially the same as those of any sarcoma of fibrous tissue origin. Broders' criteria for distinguishing four grades of malignancy were used in this classification.

Follow-up studies were made in 93 per cent of the series. The patients who died succumbed for the most part to metastases which were almost invariably in the lungs. Among the patients who were living at the time of writing 80 per cent had had symptoms for six months or less from the onset until admission to the hospital. Among those who died 75 per cent had had symptoms for a year or more prior to admission. The mortality among the patients who had a local excision plus roentgen therapy was approximately the same as among those who underwent amputation. The analysis of 1 case of periosteal fibrosarcoma based on the grade of malignancy showed that Grade 1 malignancy had a 100 per cent, of five year survival. Grade 2 showed 10 per cent of five year survival. Grades 3 and 4 showed no five year survival. The average survival period for the living and the dead were inversely proportional to the grade of malignancy. Of all the patients who had metastases all but 1 had lesions

of Grades 3 and 4. All of the patients who survived for as long as five years had lesions of Grades 1 and 2.

RICHARD J. BLANKETT, JR., M.D.

Stracker, O. Hallux Valgus (Hallux Valgus) *Wien klin Wchnscr*, 1940, 2: 885

Hallux valgus is a very common lesion. It occurs more frequently in women than in men. Age plays an important role in the degree of deviation of the big toe. According to the author's observations, a bunion is almost always formed if the deviation exceeds 20 degrees. The conspicuous hemispheric shape of the bunion is produced by the inflammatory filling of the bursa on the inner side of the head beneath the skin. The deviation of the big toe in relation to the other toes is discussed. A confusion with some other deformity of the big toe is hardly possible. Although hallux rigidus, in which condition arthritis deformans is present, is not accompanied by a bunion, a dorsal prominence can be seen nevertheless.

In the roentgenogram the bony substrate of the bunion of hallux valgus can easily be recognized. In the exposed part of the metatarsal head an extensive transformation and apposition of bone tissue take place, whereas normally in the roentgenogram the sesamoid bones are covered by the head of the first metatarsal. A deviation of 15 degrees is quite sufficient to make half of the lateral sesamoid visible on the outer margin of the bone, the mesial sesamoid being displaced to a point below the middle of the bone. The abductor muscle loses its abductor effect and becomes a flexor and rotator of the toe. Moreover, a shrinkage of the oblique head of the adductor muscle takes place and leads to a loss of its flexor effect and to its establishment as an extreme adductor. The changes in position of the different muscles as well as the resulting changes in their function are discussed.

Ill-fitting shoes are not the only cause of hallux valgus, static-dynamic disturbances play an important role in its formation. The cause is said to be a border-line pathology of the structure and the function of the foot. Because of the spreading of the first metatarsal in the pes-cavus type, and the valgus position of the proximal part of the foot in the pes-planus type, the muscles controlling the big toe exert upon it a gradually increasing force as adductors, especially if a constitutional weakness of the ligaments is present.

Treatment may be conservative or operative. The former is to be recommended in the early stages, in which there may be response to treatment. The prophylaxis consists mainly of adequate foot wear. The operation is directed against the bunion, which causes most of the trouble. Removal of the exostosis is not advisable. Further operative methods are the transverse osteotomy and the cuneiform osteotomy. The latter meets all the requirements of the pathological anatomy. Operations on soft parts are performed on the capsule, the ligaments, and the tendons. There is some controversy about the suc-

cess of the different operative methods. The kind of operation employed must be carefully selected with regard to the individual case. It can be said in favor of operations on the soft parts that they do not produce mutilation and that the period of bed rest is short.

The author concludes from his own and other writers' experiences that the operation on soft parts is sufficient in most cases.

(HAAGEN) JEFFOM G. LINDER, M.D.

FRACTURES AND DISLOCATIONS

Hills, R. G., and Weinberg, J. A. The Influence of Estrin on Callus Formation. *Bull Johns Hopkins Hosp*, Balt., 1941, 68: 238

Experiments were performed on cats and dogs to determine the effect of estrin on the rate and amount of callus formation following artificial fractures. In each animal the right radius was fractured in the middle third by an open operation with as little trauma as possible. Roentgenograms were then taken from the second to the sixth week when the left radius was fractured in the same manner and roentgenograms of the left leg were taken at intervals corresponding to those of the right leg.

The films of 13 cats were then examined by a competent radiologist. In 9 the treated side was considered as showing earlier and more extensive callus formation, 3 showed more callus on the untreated side, and 1 the same degree on both sides. The films of 6 dogs showed more callus on the treated side while those of 1 dog showed more callus on the control side. The dosages used were a little uncertain but the authors thought those used in the dogs were more accurate. Theelin was given biweekly to the dogs, the first three doses were equivalent to 20,000 units for a 150 lb human adult, and the last nine were equivalent to 10,000 units.

Three clinical cases in women are cited in which the authors thought the administration of theelin in about the above doses aided in the development of callus after a long period of non-union.

HAWTHORNE C. WALLACE, M.D.

Lagomarsino, E. H., and Dal Lago, H. Experimental Study of Rotatory Luxation of the Atlas (Estudio experimental de la luxación rotatoria del atlas). *Rev de ortop y traumatol*, 1940, 10: 121

In 1930 Grissel discussed the question of dislocation of the atlas in rhinopharyngeal lesions and since that time there has been a great deal of discussion of the subject, some authors agreeing and some disagreeing with Grissel's conclusions.

The authors review the anatomy of the cervical region, particularly of the occipito-atlo-axoid region, and describe the muscles, their attachments, and their actions. They present roentgenograms of the normal and abnormal conditions of this region, determined experimentally. They review the clinical and roentgen findings of Grissel's syndrome. They show that what he describes as a rotatory luxation in

rhinopharyngeal conditions is not a true clinical dislocation at all. The roentgenogram on which he bases his diagnosis of rotatory luxation is only that of a case of normal rotation of the atlas.

From their findings and the scanty bibliography of the subject they conclude that only rarely, as in the case described by Creeley with a rotation of the head of 90 degrees, are all the clinical and roentgen conditions found that are necessary for a diagnosis of traumatic rotatory dislocation. In the majority of cases the rotation does not pass the normal limits of reflex muscle contractions. It should be called traumatic muscular torticollis, not luxation.

AUDREY C. MORGAN, M.D.

Siebnier, M. The Treatment and End Results of Fractures of the Radial Head (Behandlung und Spätfolgen des Speichenkopfebruchs). *Deutsche Zeitschrift für Chirurgie*, 1940, 254, 193.

Conservative treatment is employed in fractures of the head of the radius when there are fractures, oblique fractures, and fractures of the neck of the radius with displacement, for separation of the epiphysis, for juxta epiphyseal fractures and dislocations, and for juvenile fractures. Two of the author's own cases were treated for three weeks with plaster splints reaching from the upper arm to the heads of the metacarpals and normal function was

restored after six weeks; no trace of the injury could be found after from one to three years.

Operative treatment is employed in fractures of the radial head when there is extensive displacement of the fragments and fixation is accomplished with wires, clamps, or nails. The ends of the bones are made smooth and a part of the head is removed with preservation of those parts which are in connection with the shaft. Open reduction is tried in fractures of children when conservative treatment has failed, since resection and extirpation lead to severe disturbances of growth and to ensuing deformities of the wrist joint.

In a boy aged twelve, open reduction was performed after simple reduction of a fracture and dislocation had failed. At first there was a good anatomical result, however, in the course of four months there was flattening of the capitulum and partial osteolysis was noted. Nevertheless the function was good; flexion, extension, and pronation were all retained and only supination was diminished. Sparing the cartilage during the operation is of the utmost importance. In comminuted fractures the fragments should be removed by operation, because otherwise large bony masses are formed which impair the function. The optimal time for the operation is one week after injury.

(SIEVERS) JEROME G. FENDER, M.D.

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Bullo, E A Supposed Active Movement of the Walls of the Peripheral Veins (Su di un preteso movimento attivo delle pareti dei vasi venosi periferici) *Rassegna internaz di clin e terap*, 1940, 21 883

Ratschow made a study of the veins, using contrast medium, in which he thought he found that the walls of the veins have an active movement of their own. He ligated the arm, so as to suspend the arterial circulation, and then injected a few cubic centimeters of abrodil into a vein below the ligature, the abrodil moved toward the heart. As this occurred during anesthesia when the arm was absolutely at rest and could, therefore, not have been due to any action of the muscles, he concluded that the walls of the veins have an active movement of their own. He saw changes in the size of the vein that seemed to be due to a peristaltic movement.

The author believed the best method of testing these results was by means of kymography, rather than roentgenoscopy, which does not show fine variations, or serial roentgenography, which shows the condition only at movements chosen arbitrarily. He seated his subject with his arm resting horizontally on the kymograph and then placed one ligature on the arm and another on the forearm just below the elbow, so that the arterial circulation was suppressed completely. He then injected from 1 to 2 c cm of uroselectan B into a vein in the lower third of the forearm. This substance was used because it can remain for some minutes without causing pain. The patient was instructed not to make the slightest movement and the first kymogram was taken. Then the lower ligature was cut and a second kymogram was taken after a few minutes. The exposure time was eight seconds, to permit the observation of changes in the veins over a considerable period of time. The kymograms are reproduced in the original article. They showed that there was no change in the caliber of the veins and that the contrast medium did not make any movement upward when the lower ligature was taken off. This proves that the walls of the veins do not have any independent movement of their own, peristaltic or other, and that the blood is forced forward by the vis a tergo.

AUDREY G MORGAN, M D

Efskind, L Conditions of Regeneration of the Intimal Epithelium after Suture of a Vessel (Die Regenerationsverhaeltnisse im Intimaepithel nach Gefaess-Sutur) *Acta chirurg Scand*, 1941, 84 283

Efskind first studied the normal anatomy of the vascular epithelium in 20 healthy rabbits and then investigated the regeneration of the vascular epithelium after mechanical lesions in 40 rabbits. In some

of the animals, a small lesion of the intima was caused by puncture or tear with a fine needle, but in most of them the vessel was incised lengthwise for 0.5 cm and then sutured. The portal vein, the inferior cava vein, and the abdominal aorta were used, the incision was sutured with vaselined silk holding intima against intima in most cases and adventitia against adventitia in a few. One row of interrupted sutures was used and a strip of muscle was usually applied over the line of suture. The suture of the three vessels took from twenty to thirty minutes and the animals did not seem to be injured by the complete arrest of the aortic circulation during the operation. The animals were killed from one-half day to sixty-two days after the intervention, most of them were vitally stained with trypan blue and some were given an intravenous injection of thorotrast in an effort to demonstrate an eventual difference in its deposition in normal and irritated epithelium and to make a differential diagnosis between epithelial cells and ameboid phagocytic cells which may morphologically resemble epithelial cells in their phases of transformation.

The intima of the vessels occupies a special place among the tissues of the body. It is an avascular organ with consequently peculiar conditions of nutrition, even its reaction to external irritation follows a peculiar course. The vascular epithelium is easily damaged by mechanical agents. In ordinary vascular suture, a rather wide zone of degenerative changes forms around the lesion, these changes are secondary to the disturbances of nutrition and are most developed when intima lies closely on intima and is out of direct contact with the circulating blood. In lesions limited to the intima, there is no reaction under the form of migration of cells from the vascular wall. The most elementary process of the regeneration of ordinary tissues is consequently absent, and the healing conditions of vascular epithelium seem therefore to be rather poor, this is confirmed by the length of the healing period which is several weeks for slight punctures or tears in otherwise absolutely normal vessels.

This slowness in healing may be due to various conditions. In addition to the poor cellular reaction of the edges of the wound, the fibrin deposit found in these lesions differs from that observed in other superficial tissues. It is formed especially by the circulating blood and only to a slight degree by exudation from the nutritive arteries, it is therefore superficial and does not stimulate cell migration. The fibrin network, which is very poor in cells, and the necrotic tissue of the edges of the wound show later little tendency to demarcation, and thereby delay epithelial proliferation and healing. Because of the poor migratory tendency, there is practically no formation of spindle cells with long prolongations which grow into the fibrin network, as found in the

regeneration processes of other superficial tissues and no orientation of the cell with their long axis radially to the lesion. New formation of epithelial cells is scarce even in the healing of large defects and mitosis of the existing cells is relatively rare.

The investigation showed that the subepithelial poorly differentiated mesenchymal cells play a decided part in the healing process if they lie under the fibrin deposit they may acquire amoeboid properties if they are in direct contact with the circulating blood they lose their prolongations are rounded off and finally present an aspect morphologically similar to that of the ordinary vascular epithelium. Very little difference was found in the healing time of arteries and veins.

No proof was found for the concept that the epithelium of large vessels can change into cells with phagocytic or hematopoietic properties or possess fibroblast potentialities. The epithelium of the large vessels is a highly differentiated tissue with strongly reduced possibilities for development and slight capacity for regeneration. The cell lining of the large vessels and that of serous cavities have decided morphological resemblances but are genetically, functionally and potentially different types of cells.

RICHARD KEMEL, M.D.

BLOOD TRANSFUSION

Turner T. B. and Discker T. H. Duration of Infectivity of *Treponema Pallidum* in Citrated Blood Stored under Conditions Obtaining in Blood Banks. *Bull. John Hopk. Hosp. Balt.* 94: 68-269.

The transfer of whole blood from one person to another by the immediate indirect method carries with it the potential risk of transmitting syphilitic infection.

In 20 transfusions discussed routine serological examination of the donor's blood did not disclose the presence of the infection. In 10 instances blood was transfused from a donor who was in the incubation period and in 9 the donor was in the seronegative phase of the primary stage of syphilis. Another patient was infected by a donor who had recently been treated for early syphilis and who at the time of transfusion had a negative serological test.

The experiments reported indicate that under the conditions obtaining in blood banks syphilis spirochetes probably undergo progressive deterioration during the storage period. Even when large numbers of virulent *treponemas* were added to citrated whole blood the mixtures were not infectious for normal rabbits after storage for three days or longer.

After storage period of one and two days although viable organisms were still present they were evidently considerably reduced in numbers or in virulence since the incubation period of the lesions resulting from the inoculation of the same amounts of the stored mixture was significantly prolonged and in some instances the inoculated animals es-

taped infection. Bloch in one experiment obtained infection with material which had been stored for seventy-two hours.

The results of the studies indicate that the infectivity of syphilis *treponemas* in citrated whole blood rarely persists for longer than three days at refrigerator temperature.

In the authors' experiments and those of Bloch in which *treponema pallidum* was added to citrated whole blood *treponemas* were present in much larger numbers than when blood from human beings with syphilis was transfused. Blood from naturally infected rabbits failed to give rise to syphilitic infection after forty-eight, seventy-two and ninety-six hours.

It seems fair to conclude the authors state that citrated whole blood stored for four days or longer even though obtained from a donor with active early syphilis can probably not transmit syphilitic infection. In a few instances normal rabbits were not infected when transfused with naturally infected rabbit blood which had been stored for forty-eight, seventy-two or ninety-six hours.

In concluding the authors state that under conditions obtaining in blood banks *treponema pallidum* undergoes progressive deterioration in citrated whole blood during the storage period. There is a corresponding reduction in the risk of transmitting syphilis by transfusion and it is probable that blood stored for four days or longer can no longer transmit this disease.

HEARST F. THURSTON, M.D.

Jakobowicz R. and Bryce L. M. The Is Agglutinin Titer of Pooled Serum or Plasma. *Med. J. Aust.* 1941 318.

The authors note that it has been generally accepted that serum or plasma may safely be given without knowledge of the recipient's blood group or preliminary cross matching tests. The absence of clinically obvious harmful effects of reactions between the introduced agglutinins and the recipient's agglutinogens is generally attributed to adequate dilution as the introduced serum in an average transfusion approximates in volume only one twentieth of that of the recipient.

The frequency of severe reactions following the use of universal donors is less than would be expected if dilution of the intracardiac agglutinins were the only factor responsible for their apparent inactivity in the recipient's blood. Ottenberg in 1911 noted that certain cases of severe anemia there would be an excess of red cells in the recipient's blood in relation to the donor agglutinins. This would result in complete absorption but in such a wide dispersal of the agglutinins there would not be enough of them per cell to effect more than minor degrees of agglutination. Often visible only microscopically. Ottenberg considered that such small aggregates would block only the peripheral capillaries and thus be relatively harmless.

Edward K. J. added that if samples of blood containing the Factors A and B are mixed

reduction is effected in the agglutinating titer of the resulting plasma. They attribute this reduction to reciprocal absorption of the agglutinins by the red-cell agglutinogens.

Two methods of preparation of pooled serum for storage are discussed. One method is to allow the blood of each donor to clot separately. The serum available is then withdrawn, measured, and pooled in amounts of 500 c cm. Small samples of blood from each donor are set aside at the time of bleeding. The serum from these is kept in the refrigerator until a similar sample is available from the pooled product, when the agglutinin titers of the individual and pooled samples are estimated by means of the same red cells.

In the second method, small samples are retained at the time of bleeding, without admixture with anticoagulant for estimation of the individual agglutinin titers. The main bulk of the blood from each donor is mixed during withdrawal with potassium oxalate. The red cells are removed by centrifugalization and the individual yields of plasma are pooled. The theoretical amount of calcium chloride is added to promote clotting. No significant difference was found between the titers of the original serum obtained by direct clotting of the whole blood, of the

plasma, and of the serum obtained from it in the absence of the blood cells.

Many investigators have shown that saliva may contain group-specific receptor substances in high concentration. It is possible to effect suppression of the agglutinins from serum by the addition of saliva which has been boiled. It is doubtful whether such a procedure would be acceptable to those responsible for the preparation of serum or plasma for therapeutic use.

Diminution of the original agglutinating titer will almost certainly occur if storage is maintained over a period of months, particularly if the serum or plasma is kept in liquid form and at a temperature above 0° to 2° C.

In conclusion, the authors state that it appears there may be exceptions to the general rule that the absorption of agglutinins will always be readily effected by reciprocal receptor substances to the extent anticipated. The most practical method of overcoming such irregularities would seem to be the pooling in one batch of as many individual samples of blood as possible. The determination of the agglutinin titer of the final product seems advisable for a control on the effectiveness of the pooling.

HERBERT F. THURSTON, M.D.

SURGICAL TECHNIQUE

WAR SURGERY

Sabatini G Bugliari G Canavero G Bertocchi
A and Others A Symposium on Injuries
Caused by Congelation (Causa di congelamento)
pe lo studio dei congelamenti M r r d etti e
940 3 56

About three years ago SABATINI established a Center of Cryopathology in the General Medical Clinic of Genoa in order to make a thorough study of injuries caused by congelation. Modern consideration of the clinical problem of congelation includes its etiology pathogenesis prophylaxis and treatment. The etiology must be studied from two points of view

1 The direct factors of congelation which consist of the external thermal factor and some immediate particular reactions of the living tissues under the influence of this factor. These reactions may be general such as direct disturbances of the mechanisms of thermogenesis and thermoregulation of circulation and of nervous activity and local involving the local circulatory and nervous functions

2 The indirect factors of congelation which are ambient and individual (predisposition)

The study of the pathogenesis must include that of the slightest primary lesions occurring in the structure of the tissues whether directly or indirectly histopathology must be associated with histophysiology for this purpose and both must be connected by studies of histophysiology histochemiophysiology histotechnics and histocollidology. The more or less complete solution of the problem of prophylaxis will depend on the progress in the knowledge of the unknown factors presented by the etiology and the pathogenesis a number of practical points are already known but many remain to be solved. Marked progress has been made in the treatment but again the solution of the problem depends on the etiology pathogenesis and prophylaxis

The author recapitulates the studies made at the Center and insists especially on the effects obtained by the use of short waves in cases of congelation suffered by soldiers on the Alpine front in 1914

BUGLIARI and CANAVERO discuss the neuroarthralgic syndromes caused by freezing in soldiers who were exposed in June and at altitudes of from 2400 to 3100 meters to a north wind in temperatures reaching -15 C at night the cases of frostbite among 5500 men amounted to about 2 per cent. The number of grave cases (second and third degree) was relatively small and that of mutilations did not reach 100 most mutilations being limited to the loss of some phalanges. The patients made up two groups those with first degree lesions and those with very slight disturbances designated at first as the syndrome of pre-congelation. This syndrome included vasomotor and neurotrophic disturbances

with pains of neuritic and arthralgic type and represented a late stage of the exposure to cold it seems that during the period of exposure the feet were more or less edematous and painful and the skin was red pale or cyanotic the findings depending on the type of vasomotor disturbance. The swelling and pain disappeared after some time but a few days later usually after a period of rest a hot bath or prolonged exposure to heat produced deep continuous pain with exacerbations especially in the toes and the soles of the feet the patient could not stand the slightest weight on his feet and heat caused intense pain he kept his toes immobilized to avoid the pain caused by any movement the skin was red thickened and at times edematous up to the ankles. Zones of hypoaesthesia were present on the internal aspect of the big toe and of the foot and white dermographism was frequent but a constant sign in nearly all cases was a peculiar perspiration of the dorsal region of the foot especially during the climaculation. The study of a number of cases showed that they passed through three stages refrigeration hypoaesthesia and neuritis with arthralgia. The disorder took a relatively chronic course and as a rule disappeared very gradually. The treatment was usually antineuralgic and alternate compression and decompression by an apparatus enclosing the leg and foot has been recommended

BERTOCCHI discusses anesthetic block of the femoral canal in the treatment of congelation and reports 2 of the 8 cases in which he has used it with gratifying results. His investigations show that the femoral canal is a prismatic cavity that may be considered closed by fibrous formations of the femoral fascia and the transverse fascia the openings in the walls of the canal are for the most part blocked by fat tissue vessels and nerves. It is possible to introduce into the canal from 10 to 15 cm of an anesthetic solution (1 per cent tetracaine in saline solution) without causing any disturbance in the patient. The anesthetic solution infiltrates the tissues which fill the canal and easily reaches the two satellite nerves and the common sheath and through the latter the perivascular adventitia. The internal saphenous nerve shows the influence of the anesthetic by hypoaesthesia and then anesthesia of its territory. The anesthetic block of the femoral canal causes active vascular dilatation in the lower extremity and the resulting hyperemia raises and accelerates regeneration especially when the damage has been caused by factors in which vascular spasm takes preponderant part. In congelation the block produces rapid disappearance of pain and perspiration and influences the restitution of sensation and the development of the processes which govern the elimination of the necrotic part and their subsequent repair. The author thinks that just as early novocainization of the lumbar chain can prevent the

painful consequences of congelation (Leriche and Mallet-Guy), anesthetic infiltration of the femoral canal, which can easily and rapidly be done by any physician, is capable of giving at least the same results

UFFREDUZZI discusses the pathology and treatment of congelation in the present war. The cases have been much milder than in the past war because the conditions of exposure were different and the troops fresh. Nothing new has been learned from the prophylactic point of view, and the measures which were already known could not be sufficiently applied under the circumstances. The treatment includes immediate and late care. The immediate care has two objects: to avoid damage by re-establishing the normal circulation as soon as possible, and to prevent infection. The late care will naturally depend on the gravity of the lesions, conservatism must be the general rule in the absence of infection. Three new facts deserve attention because they represent a real progress: injection of mercurochrome into the main artery of the involved extremity has been recommended to prevent infection, ultrashort waves have been used to restore heat to the frozen part, some interventions on the sympathetic nerves in the treatment of painful sequels of congelation have been employed advantageously in the treatment of immediate lesions, however, the anesthetic block of Bertocchi seems more rational and practical.

CIGNOLINI discusses the experimental bases and the clinical results of short-wave therapy (Marconitherapy) in lesions due to cold. Experiments have shown that short waves distribute heat uniformly through the treated organ and that no thermal difference worth mentioning is observed between superficial and deep tissues, provided that the electrodes are kept at least 8 cm. from the skin for small parts, and from 10 to 20 cm. from the skin for larger parts. This even distribution of heat applies not only to organs but also to all individual cells and the fluid that surrounds them. The technique is simple but must be used systematically, the daily treatments start with applications of twelve minutes and never exceed twenty minutes. Daily cleansing of the part, the use of sterile vaseline as medication, and strict asepsis are indicated. The intensity of the short-wave field must be minimal so that the patient has no sensation of heat for the first six to eight minutes and feels only a slight warmth between the eighth and tenth minutes. Several of the more severe among the 27 treated cases are reported. Even in the cases which were admitted with dry gangrene of a part, the treatment ended with the loss of the mummified portion only, while all other segments were saved regardless of their condition on admission. This experience offers interesting prospects for the short-wave treatment of hypothermy due to trauma and similar factors.

BORINI and MATLÉ discuss short-wave therapy of the cases of congelation (Italo-French campaign of 1940) sent to Turin. The absolute degree of the temperature is not always the primary cause of con-

gelation, and various, but no less important, individual, accidental, and climatic factors contribute to it. The different explanations of the process of necrosis of the tissues following the action of cold are given. In living tissues in which innervation and circulation persist, the necrosis caused by cold is an anemic necrosis, but there are also cases in which there is real freezing of the tissues. During the evolution of the lesions, there are times at which the changes are still reversible under the influence of opportune treatment, but integral restoration is impossible beyond certain limits, and the organism itself then provides a line of demarcation between dead and living tissues. On admission, the patients presented for the most part second-degree lesions, a few were of the first and third degree. The most natural treatment is to try to restore the circulation and, with it, the normal temperature of the part. Short-wave therapy in expert hands is the most convenient and appropriate means for this purpose. The following technique was used in 50 cases. The treatment was started with low intensity in order to avoid possible spastic phenomena. The electrodes, made of rubber for flexibility, were applied to the dorsum and the sole of the foot and were large enough to cover the lesion and part of the neighboring healthy tissues, the distance between plate and skin was about 4 cm. The wavelength used was 12 meters, and the intensity 3 ma. The duration of the daily treatment was thirty minutes and the average number of treatments needed was from 30 to 40 and reached 60 in grave cases. The treatments were rather well tolerated, in some cases, there was a rise of temperature during the first sittings, and in others an increase in pain due to the hyperemia produced by the short waves. In general, slow and gradual improvement occurred until the disappearance of all symptoms. In cases of gangrene, demarcation and recovery of the congealed tissues were more prompt than with the ordinary treatments.

PONZIO closes the discussion with some general remarks on the short-wave treatment of war congelations.

RICHARD KEMEL, M D

Upjohn, W G D. *Military Surgery Med J Australia*, 1941, 1 193

The successful management of a surgical military unit depends upon its organization. It should be the duty of the consultant surgeon to disseminate, encourage, and administrate new surgical technique. The senior surgeon should supervise the work of the operating teams, direct the work of the classification of the wounded, and cooperate in the early evacuation of the wounded in order to keep the battle zone clear and the lines of communication open. Specialists' units should only be staffed at base hospitals.

The wounded are classified in three groups: (1) those injured so seriously that they require resuscitation before operative interference can be considered, (2) the lightly wounded who can be transferred to a more distant unit, and (3) those who require immediate operative intervention.

In war surgery shock and hemorrhage are closely related. A prolonged period in either state is often further complicated by sepsis especially of the anaerobic type.

The conservation of heat is the most important single item in the treatment of the wounded soldier in shock. Such an individual should not be stripped of his clothes but should be completely enclosed in hot blankets. In cold weather it is suggested that the patient breathe his own warmed air under a blanket. Morphine should be freely administered to the patient in severe pain. Proper splinting of the injured limb should be applied early.

Limb injuries are usually contused, punctured or lacerated wounds which contain devitalized, mangled and septic tissue. These wounds can be treated only by surgical excision of the contaminated tissue in such a way as to permit free drainage. The surgeon should be capable of quick decision in deciding for or against amputation. Wounds which do not involve joints, bone or large blood vessels are effectively treated by an antiseptic dressing and immobilization which does not constrict the circulation.

A limb wound should be considered potentially dangerous when it (1) is caused by a blunt missile carrying dirt or clothing, (2) is located close to the attachment of the limb to the body, (3) opens up large cellular spaces especially in the gluteal and scapular regions, and (4) when it is arterial and involves large vascular trunks.

Gas infection may be clinically recognized by the rapid pulse, profound anemia, the odor and the edema of the limb. When gangrene is present, high amputation should be done. Skin flaps may be made but not approximated. The muscles should be cut with a single sweep of the knife. The wound should be left open and covered with a light gauze dressing. Gas gangrene antiserum, sulfanilamide and x-ray therapy are effective in treating the spreading infection.

In the treatment of gunshot wounds of the extremities, the use of the tourniquet should be avoided because it predisposes to gas infection. Bleeding should be controlled by locating the actual bleeder. If large vessels and nerves are cut, it is sound military surgery to amputate above the laceration.

Small joint injuries are best treated conservatively. The missile track, all foreign material and damaged bone or cartilage should be excised. The wound should be washed with a large amount of a non-irritating antiseptic and then closed and immobilized. If infection sets in, the joint should be opened widely and amputation considered.

Head injuries in the war wounded should be promptly treated. The scalp is infiltrated with 1 per cent procaine. The whole head should be carefully inspected. The triradial incision gives the best exposure. Osteoplastic flaps are undesirable. The brain should be cleansed by removing gross foreign material. Liquid pulped brain along the missile track is aspirated but not irrigated. If the missile cannot be

removed easily, the surgeon should not further damage the brain tissue by searching for it. The dura should be carefully preserved. Rubber dam drains are placed at each end of the wound and the scalp is closed.

Sinus tears should be quickly exposed with a strong nibbling forceps. If the sinus is completely torn, it should be ligated at each end with silk or linen.

Patients with spinal cord injuries rarely require operative interference. The relief of bladder distention and the prevention of urinary infection are the most important problems. The author recommends early suprapubic drainage with a rubber catheter connected to a sealed siphon drain.

Injuries of the face and neck should be carefully cleared under anesthesia. Radical excision of the skin need not be practiced since it has strong recuperative powers. Fractures of the jaw should be temporarily immobilized with silk or wire threads around the teeth until the patient can be transferred to a base hospital.

Wounds of the neck are dangerous because of possible damage to important structures and infection. Neck wounds should be kept open because of the danger of cellulitis and its spread to the mediastinum. An x-ray of the neck should be taken to locate foreign bodies. While the patient is being anesthetized, the surgeon should be prepared for sudden hemorrhage, especially during the induction period. In wounds with large hematomas, careful inspection should be made for small arterial or venous tears which predispose to arteriovenous aneurysms.

Patients with chest wounds suffer not only from shock and hemorrhage but also from severe dyspnea. Any open thoracic wound should be quickly closed without anesthesia by suture or if too large, plugged with a dumbbell gauze pack. The patient should then be given morphine and oxygen. Pneumothorax is effective in stopping the bleeding from a lacerated lung. Operations should be performed in the following types of the acute injuries: (1) compound fracture of ribs, (2) pleural bleeding, (3) pain on respiration from a foreign body, (4) open sucking wounds, and (5) in cases of an easily available large foreign body. Ether is the anesthetic agent of choice. Best surgical exposure is obtained along the fifth intercostal space. Blood transfusions and x-ray examinations of the chest should be made routinely. Postoperative effusion should be treated by aspiration on the second or third day after its appearance. Irrigation of the pleura should be regarded with disfavor.

Infection of the chest wall, especially in the cellular plane between the latissimus dorsi and the body between the scapula and the serratus muscle, between the serratus muscle and the body and along the pectoral fascial planes, proceeds rapidly to fatal sepsis unless proper drainage is instituted.

Wounds of the buttock may cause severe infection or hemorrhage.

BENJAMIN J. P. SHAPIRO, M.D.

Geisthoefel, W. War Experiences from the Surgical Division of a Base Hospital (Kriegserfahrungen aus der chirurgischen Abteilung eines Reservelazaretts) *Muenchen med Wchrschr*, 1940, 2 933

This report comes from the base hospital associated with the University Clinic in Frankfurt a. Main. By means of air transportation, many cases arrived at the base hospital as quickly as they would have been carried to the field hospital. This form of transportation was of value in cases of extensive gunshot fractures, gunshot injuries of the head and vertebral column, and of gunshot wounds of the abdomen after they had been operated upon at the front, to avoid loss of valuable time, and of gunshot wounds of the chest if the open pneumothorax had been closed. Blood transfusions were valuable in treating septic processes as well as in aiding the healing of large wounds. Results from the use of tetanus antitoxin were good. Of hundreds of cases, only 2 cases of tetanus were seen. The author advises the use of gas antitoxin in the presence of extensive wounds in the region of the buttocks or of the lower extremities. Serum exanthemas occurred very often. Pulsating hematomas, i. e. aneurysms, were operated on at once if the wound involved only one vessel, the ligation of which could do no harm. Otherwise operation was delayed till the collateral circulation was functioning, and then double ligation was preferred. It is not wise to delay amputations as is done in peace time but they can be delayed somewhat more than is the custom at the field hospitals. However, amputation of gunshot fractures of the femur should not be delayed too long as patients do not do well with long periods in bed. It is difficult to detect phlegmons and abscesses in the latter cases. To avoid these complications, the patients are not placed on a Braun splint, but a horizontal traction splint is applied with a wire to the os calcis, but not to the tibia or the femoral condyles because of the danger of infection. Also, the fragments may be displaced if this is done. Abduction splints should not be used for the upper arm in the presence of chest injuries, traction on the ventral aspect of the ulna is recommended. Delay of amputation in the presence of comminuted fractures of the upper arm is not advisable if there is any infection or when one or more nerves are involved. Amputation should be considered early also in infected gunshot wounds of the shoulder, hip, or knee joints. Gunshot wounds of the abdomen seldom reach the hospital in time to be operated upon. However, 2 soldiers were saved because they had not eaten for some time before the injury, which facilitated late closure of the bowel perforations. In the case of fecal fistula from extraperitoneal bowel perforation an artificial anus should be made to prevent fecal phlegmons. Dogmatic opposition to laminectomy is erroneous if the wounded complains of pain, even in the absence of positive x-ray findings. In three such cases widely split vertebral arches with compression of the marrow were found and relief of pain followed the

laminectomy. Thoracocentesis is done for hemothorax only when there are signs of displacement. Empyemas are treated with thoracocentesis and Buclau's drainage.

Surgical removal of old contaminated wounds, as well as of scalp wounds, is avoided. Frequently, fractures of accidental nature are treated by open reduction with a Lane plate, and the binding is made with double catgut rather than with screws. However, in the case of oblique breaks the fragments are wired, while the Lane plate with screws is used for transverse fractures.

(TRAN?) RULON W. RAWSON, M.D.

Kirschner, M. Imbedded Missile Traumatism. Operative Removal of Imbedded Missiles (Die Steckschussverletzung. Die operative Entfernung des Steckgeschosses) *Chirurg*, 1940, 12 597

This is a very scholarly and instructive article made especially informative by 40 illustrations, and should be read by every military surgeon. In addition to the firearm shots, there are secondary shot results, such as the imbedding of uniform buttons, knapsack buckles, and other articles, that demand our attention. Even beyond small shot-openings very large missiles may be found. There is a discussion of the causative factors of the imbedding. It is curious that most of the imbedded infantry shots are completely turned around with their points facing outward. The path of the buried shots is sometimes marked by metal-smudge. The copper shot of the French, the D'Balle, does not shed any metallic parts but usually takes on a sharp angular form. The only proof of Dum-Dum injuries depends upon finding that type of missile, but these have not yet been used. The "Balles sectionnés" are no Dum-Dum missiles, as they are not mantled missiles, they served only as exercise or shattering ammunition. Air in shape of large bubbles is often found around imbedded bullets but not in pinnate formation projecting between the muscle fibers as in gas edema.

Thousands of the imbedded masses heal without reaction and leave smooth rather than roughened wound surfaces. Despite this fact they may be a source of danger, e.g., of late infections, tetanus, perforation of important organs, and hemorrhages. They may change their location in hollow organs, in hollow spaces, or may form embolic invaginations. The bland traveling infection is attributable to the wandering of these imbedded masses into the soft parts, according to Kirschner's theory. Missiles never wander against gravity, they may cause or favor secondary infections and then abscesses or fistulas result. If found in danger-zones, the buried missiles should be removed if at all possible. Large hand grenade shells nearly always produce fistulas. Sometimes even without removal of such shells, the fistulas they produce may heal spontaneously. The best chances for aseptic healing of imbedded shots are found when the missile is smooth, or is a very small sharp-edged splinter passing through a long shot wound canal. The diagnosis is not as easy as one

imagines because often the site of entrance of the shot into the body can hardly be ascertained or it may appear as a mere surface abrasion. Or there may be an in and-out shot with a division of the missile one part of which remains in and the other passes through the body.

Operative removal. An imbedded missile is more or less an indication of good body resistance. Despite this fact the indications for removal should be carefully considered. In general the surgeon should know that the larger the projectile and the nearer to the skin the greater the danger of its surgical removal. He should not attempt a primary removal of large caliber shots except when they lie immediately under the skin or are otherwise easily reached. In large shot wounds much time should not be given to searching nor to exploring distant sites for missiles. In cases of multiple small shot wounds e.g. a minor grade splinters it is naturally impossible to remove them. It is encouraging to note the statement of Kirschner that the dream of totally excising fresh shot wound sites is universally out dreamed or outmoded. The general surgical principle of leaving a primary wound following gun shot excision wide open is supported by the fact that residual shot material may be found in the wounded area. Naturally there are exceptions when primary excision of shots is laudable e.g. when there is a large projectile in a joint when a missile lodges below the skull and lies on the brain or when it presses on the spinal marrow. In the breast or in the abdominal cavity missiles should not be sought primarily.

Further during the course of wound healing shots should not be removed except when they are probably causing or lead to suppuration. Shots buried in healed wound are variously considered and treated by different surgeons. Sensitive infection areas justify the removal. Some operators are very reluctant to attack these cases and await action until cicatricial tissue forms. Kirschner does not approve of this procedure. He was able to heal a trigeminal neuralgia caused by a shot found in the vicinity of the foramen oval after twenty three years and he also effected a cure of an intercostal neuralgia which was the result of a shrapnel bullet. In motor paralysis the indication is naturally very delicate. To remove shots from the deeper brain areas as a fundamental indication is not permissible. If the missile is quite large and lies only a few centimeters deep and further if it can be reached through unimportant brain tissues the removal should be considered if danger is present or threatened by leaving it in situ.

Operation is imperative if imbedded shot causes a late epilepsy. Buried shots must be removed when they cause interference with activities of muscles or joints or when they cause pressure against the trachea bronchi or esophagus or when they are found near large vessels with the possibility of causing erosions or have already caused bleeding. Because shots buried in lung tissue often cause small aneurysms with hemorrhages they also should be removed by operation. The necessity for opera-

tion is also definite when imbedded shots are found in the genito urinary tract. Occurrence of metallic poisoning is practically nil. Increase in the basophilic granulo-erythrocytes is proof of chronic lead poisoning as well as the sign of its presence in the urine blood and liquor cerebrospinalis.

The establishment of locations. If shots are found under the skin they can be ascertained by puncture as but local anesthesia should be employed here tactfully as the connective tissue is easily displaced. Roentgenologically the two plate method the fluoroscope or the stereoscopic examination may be employed. Despite the best and most definite localizations the deep seated small shots often cannot be found notwithstanding the aid of all the most efficacious methods. Site markings or site pointers are often necessary. After establishing localizations the difficulty is to maintain and follow the direction indicated by the fluoroscope or plates when operating. It is safer to contact the foreign body by probing before undertaking the operation. For this purpose Kirschner mentions special needles encased in wood which keep the hands out of the range of the x-rays. For small shots the injection of methylene blue into the tissues surrounding them is a good method. For measuring depths the author recommends the Fuerstner depth meter. He regards Siemens' new apparatus for measuring depths by means of the fluoroscope only as a reliable. Operations with the aid of roentgen rays require transparent plates over the field to be operated upon with a cloth under the table. In place of ordinary lights halogen lights are recommended although outlines are not so sharply defined therewith. The important view obtained with the binocular scope is not found with the monocular method. The removal of the missiles while the roentgen rays are being used is dangerous for the operator and his assistants as the effect of the rays is easily accumulative. The two plate method of procedure gives only an approximate location of the missiles. However the stereoviews are very reliable. The location of the shots can often be established by movements of the body organ. Kymography often is a good solution of localization but as a depth meter is not usable. Pycnograms of buried shot in or around the kidneys are helpful. Siemens invented an acoustic metal finder which brings the pitch of a tone heard in its megaphone higher and higher the nearer the approach to the missile. The retractors must be of non-metallic material (novotex) when searching with this apparatus. Kirschner had very good experiences with this method. The technique of operative removal is naturally very different. Often the preparations must include regular anatomical planning. The author does not favor the giant magnet in these cases. Thin connective tissue can penetrate the magnet from attracting the hidden shots. Besides most shots are non-magnetic. Finally Kirschner warns against the search for imbedded missiles by inexperienced surgeons and hospitals without proper equipment. Imbedded missile departments which

are convenient to the homes of the patients are essential (FRANZ) MATTHIAS J. SPIRAT, M.D.

Ritter von Beyer, H. The Problem of War Amputations (*Zum Problem der Kriegsamputierten*) *Deutsche Wilt. wzt.*, 1940, 5 368

The author discusses his experiences in the World War of 1914. He recommends first of all a sanatorium for individuals who undergo amputations. The orthopedic institutions in Würzburg and Heidelberg and the largest German orthopedic Reserve Hospital in Löttingen were those in which all of the author's work was done. In the last the patients convalesced and were trained for 35 different occupations. The last is important from the medical standpoint.

A strict rule for the height of amputations cannot be made because it never does justice to the individual needs. For the first amputation the author advocates the old rule of making the stump as long as possible. A subsequent amputation is then very often necessary. This should be done by an orthopedist who collaborates with a prosthesis maker. The type of subsequent operation is influenced by the presence of fistulas, adherent infected scar tissue, and defective padding of the stump end. Fistulas often arise from silk ligatures and for this reason one should always ligate with catgut. Frequently there are marginal or coronal sequestra of bone. Spooning out the marrow and stripping back the periosteum should be abandoned, as well as the plastic bone-covering procedure of Gritti. Sharp pointed spicules on the bone end can be avoided by pressing a soft cushion against it for ten days. The skin will not adhere to the bone if one places muscle between the two. Constant massage of the stump by the patient in a peripheral direction is important. Lengthening of the skin is often prevented by the formation of cicatricial bands between the skin and subcutaneous tissue. Frequently one can break these up with small incisions as far as they are palpable.

With every secondary operation a gauze drain is placed through a small 5 cm. incision in the skin and left in place for forty-eight hours. Fourteen days after the operation the patient is allowed to stand up and is given gymnastic exercises. Patients with leg amputations receive only two sticks, no crutches. They are exercised to gain proficiency in leaping. The ability to swim 1.45 meters is very important.

The author differentiates between early, transitional, and final prostheses. Wooden legs with plaster funnels have fallen entirely into disuse because they are heavy and not very durable. A sitting stick is introduced as an early prosthesis. This rests against the hip on one side and takes on the form of a broom stick at the bottom. It has a plate which comes in contact with the floor. One strap passes over the shoulder on the well side, a second passes to the lame buttock as a soft sitting strap, and a third annular strap fastens the stump to the prosthesis. This prosthesis can be made by any carpenter. It is light and durable and permits free respiration of the skin of

the amputated limb. Many workers prefer it as a permanent prosthesis.

Transitional prostheses include leather legs with tubercle seats made of metal. The patient is not supposed to ride on the tubercle seat however, but on the parts before it. This may be used for either thigh or lower leg amputations. For the latter the author always removed the head of the nubul with 10 cm. of the shaft for better closure. He does not recommend an ankle joint in either thigh or lower leg prostheses.

Final prostheses include artificial legs made of wood. Metal legs have too great a capacity for thermal conductivity and require frequent repairs. The most important part of a thigh prosthesis is the height of the shell. This should not be circular, but triangular. Limitation of extension at the hip joint is not always disturbing with a short stump the brace can be utilized as a weight bearing surface. This is also true at the knee joint. The simple hinge joint is the best type of joint for an artificial leg.

Special cases require special prostheses. For the thigh stump the Kroll leg which is derived from the sitting stick is very popular. It is a leg shaped wooden leg without knee and ankle joints. When walking it rolls over the anterior ball of an artificial foot part. It is cheap, durable, and firm, and has the added advantage of rotating ability.

No comments are made concerning artificial arms patterned after the Sauerbruch arm. The division of patients into head and hand workers is in many cases not entirely appropriate. It is better to distinguish between one-handed and two-handed workers. Most of them require only one protective arm.

Although these prostheses do not always completely resemble a sound limb the patient should at least be able to flex the fourth and fifth fingers. It is incorrect for the thumb to touch the tip of the first finger.

Finally the author describes very accurately his working arm, the construction of which must be read in the original article.

(FRANZ) I. DE VED W. GIBBS, M.D.

Henschen, C. Recommendations on War Surgery of Face Wounds (*Richtlinien zur Kriegschirurgie der Gesichtverletzungen*) *Selbstmed. Heftschr.*, 1940, 2 711

Henschen recommends the safety-pin technique for emergency cases of face wounds.

1. In wounds of the floor of the mouth in which the middle of the mandible is shot away, a safety pin should be passed through the tongue vertically a thumb's breadth, placed vertically before the lips, and a cord passed through the eye of the pin should be fastened behind the ears or to the top uniform button. This will prevent the tongue from falling back.

2. By means of a safety pin, one can also prevent the displacement of a trachea or esophagus perforated by a shot if one fixes it to the skin. Also, the lung in open pneumothorax can be fastened to the extracostal soft parts, a hole in the bowel can be

provisionally closed or an eviscerated bowel can be anchored to the skin

3 For emergency fixation of the mandible after shot wound the author recommends a wire cradle. For this a cradle or trough shaped wire netting which can be cut easily with shears and which can be constructed with wire gutta serena or even adhesive plaster should be used. It has the advantage that in it no collection of saliva or wound secretion can form. For absorbent material the patient is given a supply of sterilized cellulose which is the best absorbent. The skin should be lubricated with a salve. Zincol Kaolinbren or Auro Kaolinbren are the best. The author does not use the chin bandage recommended by von Axhausen as an emergency dressing nor does he use a chin cap of cellophane plaster of Paris as it softens too quickly. Likewise he does not use chin caps of aluminum or of other metal if they are not perforated. For defects of the maxilla from gunshot wounds and for defects of the soft parts about the zygoma restraining devices of strong wire netting with supporting bands of iron protecting from the slope of the superciliary ridges should be improvised.

Emergency fixation of loose flaps and bone fragments in fractures of the lower jaw due to gunshot wounds can be made by means of safety pins. Henschen emphasizes that the surgeon must give due attention to the contraction of scars. Of the facial muscles only the masseter is concerned directly in the form of the face. The other muscles are too thin nevertheless they influence the expression because of their attachment to the skin. They exist mostly in the form of small muscle bundles which are parallel beneath the different portions of the skin. Only in the frontal region on the ala of the nose in the lips and on the chin are the pull of these small muscles interlaced with one another. Furthermore the fat lying interposed in little clumps is important. An abundance of connective tissue occurs only in the masseter the pterygoid internus and in the temporal muscles. In consequence of this a keloid development of the scar quickly occurs in these places. The question of whether the emergency treatment of the bone or of the soft part injury should be done first is important. Franz has opposed primary operative wound treatment for the face as an exception to wounds in general because the danger of infection in them is small. Opposed to him are the modern oral surgeons who demand complete and final repair within six or eight hours. Henschen agrees with Reichenbach and Richter in orthopedic bone treatment and to this adds the wound treatment of the overlying soft parts but for this there must be either a dentist experienced in jaw surgery or a close collaboration between dentist and surgeon. In war this will not always be possible in the front line and therefore Henschen gives advice for the emergency treatment. One can place flat fragments at rest in the simplest manner by passing the largest safety pin about the skin and bone and through the floor of the mouth and anchoring this to a fixed point

of a well fitting extra oral bandage by means of a wire or cord or a second safety pin fastened to the outer bandage. Through this the well known Bruhn extension hook is replaced. This procedure is also possible in toothless lower jaws. Then follows the emergency soft part wound treatment the removal of foreign bodies washing with hydrogen peroxide and molding i.e. making secure the flaps of the soft parts over the profile of the mandible with safety pins. Also mucous membrane flaps tongue wounds and parts of the floor of the mouth and nostrils allow themselves to be so fixed. For this one needs a complete set of different sized well sharpened pins. The ends of the pins should be cushioned with 10 to 15 mm gauze. Henschen then quotes Seifers who does not recommend the debridement of the wound itself within six or eight hours. Primary suture is not good because of the rapid suppuration of the suture tracts. At best only a few retention sutures should be used. Complete closure should not be done. For this purpose long U shaped needles obtainable at hardware stores which pass easily through the soft parts and can be bent at the ends are also suitable.

(TRA 2) JOHN R. PAINE, M.D.

Ganzer H. The Plastic Reconstruction of the Face and Facial Bones (Die plastische Wiederherstellung des Gesichts). Teil I. Die Gesichtsknochen. (The Plastic Reconstruction of the Face and Facial Bones. Part I. The Facial Bones.) Deutscher Verlag, Berlin, 1940, 747 pp.

The author relates his own extensive experiences gathered as an oral surgeon from a numerous and varied clinical material in Berlin during and after the war from 1914 to 1918.

His method developed in the course of work followed lines of physiological thought and employed the laws of physics dynamics and statics. The preparation of injuries to the facial bones (reposition and splinting of the fracture fragments) as well as the transplantation of distant bone into bony defects represents physiologically established mechanics. The plastic replacement of destroyed soft parts as well as the plastic surgery of the palate represents physiologically founded geometry.

Of the great number of significant practical instructions several are especially worthy of mention. Even when the wound receives their first care the plastic reconstruction of defects in the soft parts and in bone should be held in mind. Gaping wounds of the lip are closed as soon as possible after the mandibular fracture fragments have been splinted. The closure of the orbital incision is important at this time. The wounded individual thus rapidly becomes ambulatory and capable of convalescence and work. Words are unnecessary to describe the ensuing improvement in morale. The coloring of the exposed bone is essential to avoid dry necrosis. If the wound is closed by suture the bone may at least heal and recover. Cases such as the maxilla and the maxillary and orbital cavities must be held open in every case by tamponade or similar means.

The technique of early closure is described in detail. In this connection it is emphasized that suture must be preceded by immobilization of the fracture fragments. If bone transplantation becomes advisable later, it is sometimes necessary to precede it by the revision of scars. The author has done both in one operation.

After practical directions on the method of applying external dressings, care of the antrum, treatment of erysipelas, and operative fundamentals outside the mouth, there follow more detailed expositions of plastic coverage of soft-tissue defects and of the elements of bone transplantation.

With respect to traumatic defects of the soft parts, Ganzer prefers the use of primarily pedicled skin flaps with underlying fat and connective tissue to any other method. Regarding bone transplants, he says definitely that if one is guided by the laws of physiology and physics, it is a simple operation. For its success, it is necessary that the existing pieces of bone are well supported. When direct splinting is not possible, the author makes use of the masticatory pressure of the unaffected side, with the aid of a bite splint for traction on the injured side. He prefers not to construct these dental splints directly on the patient, but to model them from plaster molds. Final dental and oral hygiene is postponed until the most important operations have been completed. A non-viable tooth often has sufficient temporary value. Hence, one should not remove teeth so long as they do not lie in the fracture line and thus delay healing.

The technique of bone transplantation is carefully described. The transplant is exactly fitted and grooved, but not fastened with wire or any other foreign body. It must, nevertheless, lie in its new position in such a fashion that the patient may open and close his mouth a few times in the presence of an open operative wound without the transplant's losing its place.

Explanations of plastic procedures for the closure of palatal defects, which were reparable in every case, are also included. The author distinguishes (1) perforations, which may be supplanted nasally and orally by intra-oral material—in these cases it is important that the implant has some sort of outer skin on both sides, (2) perforations which, because of their size, permit nasal epithelization, but for which the intra-oral material is inadequate for the oral roof—for these outer skin is used, and (3) perforations for which the intra-oral material does not suffice even for the nasal side—in these, nasal and oral epithelization is done by means of outer skin.

The description of two combined major plastic operations forms the conclusion of this work, which is highly informative for the army surgeon. The procedure deals with an extensive plastic replacement of the chin with three bones, preceded by extensive soft-part transplantation, with a total plastic substitution of the orbit.

Summarizing, Ganzer says that preparation for later plastic work begins with the first care of the

wound. A few stay sutures are of great advantage in holding the tissues in proper position beneath the dressing. Fragments and splinters of broken bone should not be removed. The care of the wound is accomplished from within outward. Dental splinting is first. The splints are prepared from imprinted molds. Gaps and toothless portions are provided with occluding surfaces to take advantage of masticatory pressure for reposition. Extra-oral splints are seldom necessary and then only for a short time. This applies also to attachments between the upper and lower jaws. After the splinting has been finished, the outer wounds are united by suture so long as there is no loss of substance. This can be carried out before the appearance of inflammatory changes after wound excision, or promptly after the regression of inflammation. The wire suture is advantageous, because it retards stitch-hole suppuration and tolerates moist dressings. Plastic repair of soft tissues is done only after the wound is completely clean, by employment of cuticular sutures, and the plastic repair of bone is done still later. The technique thus results in a support of the fracture fragments by the transplant as such. Nasal and oral epithelization is absolutely necessary for palatal reconstruction. With the aid of extra-oral material, the greatest palatomaxillary defect may be filled.

The work is accompanied by 219 illustrations (HEINEMANN-GRUEDER) O. THEODORE ROBERG, JR., M.D.

Frey, E. K. *Gunshot Wounds of the Lung* (Ueber Lungenschuesse). *Muenchen med Wchnschr*, 1940, 2: 1197.

The statistics of the World War show that 3.6 per cent of all the wounds of the chest are non-penetrating and 2.6 per cent are penetrating. The statistics of Franz show 22.3 per cent of fatalities.

The author then discusses gunshot wounds of the heart treated with tamponade, which must be differentiated from cases bleeding to death. With distention of the cervical veins, a more or less marked cyanosis calls for tamponade of the heart. Puncture of the pericardium may save life. An anterior exposure will hardly be possible.

In Poland and France, where Frey acted as consulting surgeon, he did not often see injuries of the respiratory and esophageal passages, they were usually associated with injuries of the large blood vessels. The patients with gunshot injuries of the lungs revealed very varying pictures. At times they were almost asymptomatic, namely, in infantry gunshot wounds through the upper lobe, and on the affected side even the respiration was barely diminished, but even in these cases absence of infection was rare. An aseptic dressing and 0.02 gm of morphine are indicated. The observation of Frey that the sitting or half-sitting posture is not always the most comfortable position for patients with lung injuries is interesting. Many find themselves more comfortable in a flat position. In contrast to these pictures are those with severe symptoms including shock, dyspnea, and a small pulse.

The author call attention to the frequently difficult differential diagnosis between retained projectiles and an abdominal injury because even in cases of pure gunshot wounds of the lung a painful tension in the upper abdomen may be present at any rate this is usually only unilateral Hemoptysis was absent on an average of 2 or 3 times among 10 in *juris* and it usually ceased after four or five days Emphysema of the skin also was rare Hematothorax was often very slight so that it could not be demonstrated Hemorrhage into the peritoneal cavity may also originate from the internal mammary or the intercostal arteries One should bear this in mind when the hematothorax refills again soon after the puncture A collection of air in the closed thoracic cavity in itself need not be treated except when it constantly increases and leads to pneumothorax under tension Frey did not often see mediastinal emphysema it is a bad prognostic sign However it not rarely appeared on the second or third day but could then in part be treated successfully

Open pneumothorax must be immediately treated surgically As a matter of fact Franz has seen to it that a water proof dressing is placed in the pocket of every ambulance man with which an airtight dressing is to be applied immediately With marked coughing this easily becomes loosened or is displaced by trickling blood during the transport and therefore the suturing of the musculature and skin after surgical dressing of the wound under local anesthesia should be done at the troop or main dressing station if it can be done within twelve hours This was mostly the case in France The author does not think much of suture of the lung to the thoracic wall Usually this is impossible because the lung has retracted too much or the tension is then too great and the sutures easily tear through The author condemns the percutaneous pneumopexy of Rehn because the disadvantages are greater than the advantages He believes that in this war it will not be used to any great extent After twelve hours have passed the Sauerbruch procedure comes up for consideration This includes thoracic anesthesia a Mikulicz tampon distention of the lung and an airtight dressing Generally in the poor general condition it is impossible to test and care for the wound of the lung during the surgical care of the wound However in 1 case the author was able to operate with the best of success at the main dressing station upon a gunshot wound of the lung with wide ploughing up of the diaphragm

In the late treatment the author punctures the hematothorax only when the symptoms of displacement appear and then allows only from 200 to 300 cc of fluid to escape Blood transfusions are very useful The author has had the experience that with sincere effort these can be given also anteorly In tension pneumothorax the puncture is done first air is allowed to escape and if this is not sufficient the cannula is left in place and a thin rubber finger cot which is incised at its tip is attached to it In

mediastinal emphysema very good results are sometimes achieved with transverse incision in the neck but sometimes the results may be disappointing The treatment of the empyema is carried out according to presently prevailing principles As a matter of fact the author also has observed recovery after one or several punctures as has previously been seen in the World War Resections of the ribs should be done only after eight or ten days and this on the eighth or ninth rib with the permanent drainage of Petrus In the presence of thin pus Bellau drainage will also suffice

The question of transportation is very important Even the cases of slight gunshot wound of the lung should not be transported before at least three days but even then unforeseen transports occur The best form of transportation is the aeroplane In this respect the author has been able to draw some very interesting comparison with automobile transportation in which he not rarely saw hemorrhages and other aggravations

(TRANZ) LOUIS NEUWELT MD

OPERATIVE SURGERY AND TECHNIQUE POSTOPERATIVE TREATMENT

Kog n I S Homoplastic Transplantation of
Fascia New York 1940 47 33

In experiment on 30 rabbits the author convinced himself that a homoplastic transplantation of fascia is successful in a large percentage of cases The transplanted fascia retains its structure and the result is not attributable to a simple regeneration of tissues A union took place in 21 of 30 operations while in the remaining cases suppuration aseptice separation or absorption of the transplanted tissue took place In successful cases granulations new capillaries and histiocytic reactions were noticed eleven days after transplantation After fifteen days fully developed connective tissue was found while after twenty days the young tissue was highly vascularized and firmly united with the recipient's fascia Forty five days after transplantation the union was complete One hundred and twenty days after the operation fibrous tissue completely filled the space between the fascia of the donor and the recipient

The author concludes from his experiments that after a homoplastic transplantation of fascia not absorption with consecutive regeneration but actual union of the transplanted fascia with the adjoining tissues takes place

JOSEPH K. NAR. MD

IIIH D K The Determination of Blood Volume in
Shocked Patients Los Angeles 1942 24 177

A simple and accurate method for determining the total blood volume while a shocked patient is receiving treatment is described It depends on observation of the change in hemoglobin concentration after infusion of a known quantity of blood from which the plasma has been removed The added blood is of considerably higher hemoglobin concentration than that of the patient and is infused

rapidly. Accurate hemoglobinometry of the added blood and of the patient's blood before and after infusion is done by a photo-electric method. Calculation of the blood volume of the recipient before infusion is made by means of an algebraic formula. The method is of value in circumstances in which determination of the blood volume by other means would not be justifiable. WALTER H. NADLER, M.D.

ANTISEPTIC SURGERY, TREATMENT OF WOUNDS AND INFECTIONS

Dimtza, A. Disturbances of Blood Perfusion of the Extremities after Accidents (Ueber Durchblutungsstörungen der Extremitäten nach Unfall). *Ztschr. f. Unfallmed. u. Berufskrkt.*, 1940, 34, 123.

The action of a blunt force may cause damage to the vessels, especially to the arteries and the sympathetic nerve fibers which surround them. This damage is not always easy to determine. Permanent vasomotor disturbances then occur which start immediately after the accident or more or less shortly after, often without any vascular disease. If vascular disease has been present previously, it makes evaluation more difficult and imposes the necessity of special consideration of the manner in which the accident has occurred.

In young subjects, it will be necessary first of all to think of Winwarter-Buerger's obliterating endarteritis which, in fact, is not very rare. In older subjects, the question of a previously present vascular sclerosis will have to be cleared up. It must be remembered also that blood, kidney, and skin diseases, as well as syphilis, may lead to similar disturbances of blood perfusion. All these diseases produce similar symptoms in the extremities, beginning with transient discolorations and sensations of cold, or disturbances of perspiration, up to the most severe painful conditions with ulceration and gangrene.

One of the most important methods of examination to recognize and evaluate circulatory disturbances is the oscillometric measurement of the blood pressure. The author uses this method for the four extremities in all cases. During the patient's visit to the doctor's office, changes in volume synchronous with the pulse are transmitted to an appropriate blood-pressure apparatus under variously selected pressures. If better insight into the circulatory relations is found necessary, the use of arteriography is indicated, as in doubtful cases it indicates whether there is a disturbance of the blood perfusion on the basis of a vasomotor or an organic disorder of the vascular wall, and it shows not only the location of the disorder but also the condition of the corresponding collateral circulation.

The author fully describes 4 cases. In the first 2, a permanent spastic vascular condition originated after a blunt traumatism, and careful investigation showed that no organic vascular disease had previously been present. In the third case, a fracture of the left femur gave rise to a vasomotor disturbance of the left leg with vascular spasms of the muscula-

ture of the calf and marked hyperhidrosis of the left foot. In the fourth case, amputation of the limb was the only possible recourse in an old obliterating endarteritis which caused severe pains, ulcerations, and insomnia. The treatment in the first case consisted of acetylcholine injection and suction therapy at the site of the wound, and in the second and third cases of extensive sympathectomy of the femoral artery. (EGGERT) RICHARD KEMFL, M.D.

Stepin, S. A. Galeazzi's Fracture. *Nor. khir. arkh.*, 1940, 46, 195.

The term "Galeazzi's fracture" or "Dupuytren's fracture of the forearm" is applied to a fracture of the diaphysis of the radius, 7 or 8 cm. above the wrist articulation combined with a dislocation of the distal end of the ulna. In 2 per cent of 2,000 fractures of the forearm, such a syndrome was found by the author. Frequently the syndrome is overlooked and the condition is interpreted as a simple fracture of one of the bones of the forearm. Furthermore, the statistics may be influenced by the fact that some authors do not consider a fracture of the radius at the junction of the diaphysis with the lower metaphysis without typical clinical symptoms of the dislocation as Galeazzi's fracture. The author is of the opinion that the trauma just mentioned is more frequent than is generally assumed. He furnishes histories of 4 such cases.

A similar proximal syndrome consists of a fracture of the upper third of the diaphysis of the ulna and a dislocation of the head of the radius. Certain anatomico-physiological peculiarities of the forearm explain a similarity of both syndromes. The radius and ulna taper off in opposite directions, while the broader ends are firmly immobilized in the corresponding articulations, the thin ends are kept in place only by the ligamentary apparatus, viz., the head of the radius by the annular ligament and the head of the ulna by the interarticular disc or the so-called triangular ligament.

The forearm represents one single unit from the functional point of view, and definite analogies may be found in regard to the position of bones in the proximal and distal articulations in the course of rotatory movement.

The proximal syndrome is nearly exclusively caused by a direct trauma applied to the posterior aspect of the upper third of the forearm, while direct and indirect traumas are responsible for an equal number of cases as far as the distal syndrome is concerned. An angulation of the fragments of the radius is typical and the angle may be open in the anterior or posterior direction. The dislocation may also be either anterior or posterior. A separation of the styloid process of the ulna, frequently accompanying Galeazzi's fracture, facilitates the dislocation. Usually the proximal fragment of the radius is found in supination and the distal in pronation, the position last mentioned being caused either by the weight of the wrist or by a contraction of the pronator quadratus muscle. The lower fracture of the radial

diaphysis the more frequently is found a dislocation of the distal end of the ulna. There is considerable dispute concerning the question as to which ligament must be torn to allow a dislocation of the distal end of the ulna. The author is inclined to believe that the intra-articular disc is the only one that deserves attention in this respect.

Röntgenograms taken in two directions facilitate the diagnosis. In doubtful cases iodol is introduced into the radio-ulnar articulation; appearance of the opaque substance in the radiocarpal articulation points to a tear of the interarticular disc.

The differential diagnosis should consider a separation of an epiphysis in children and also Madelung's deformity in adolescents.

An injury of the ulnar or the posterior interosseous nerves is the most serious complication of the upper or lower syndrome. Delayed union of the fragments of the radius or a pseudarthrosis have also been reported. Occasionally a deforming arthritis of the distal radio-ulnar articulation may develop.

As to the treatment of Galeazzi's fracture both the fracture and the dislocation should be reduced one following the other no matter in which order. An open reduction is sometimes necessary. Closed reduction is performed according to Boehler's method under regional anesthesia with the forearm in supination. Either a circular plaster of Paris cast or a posterior moulded splint is applied after reduction with the forearm in a semisupination and the elbow flexed 90 degrees or more. Active motions of the forearm and a slight massage are instituted after from eight to ten days and the cast or splint is removed after from fifteen to twenty-five days. If an open reduction is unavoidable, best results may be expected from the intra-extramedullary osteosynthesis. After a proper approximation of the fragments the dislocation can usually be reduced in a bloodless manner but occasionally an arthrotomy of the distal radio-ulnar articulation may be indicated in the presence of an interposition of soft tissues or cicatricial changes in the capsule. In cases of malunion or a persisting dislocation with a good approximation of fragment various operative procedures may be necessary. Plastic operations employing fascial or a replacement of the interarticular disc by a portion of the tendon of the flexor carpi ulnaris muscle have been suggested. An attempt to place the ulnar head in its normal position without a preliminary osteotomy of the radius is usually unsuccessful.

JOSEPH K. NAKAT, M.D.

Winfield J. M. Anatomical Diagnosis of Injuries of the Hand. *J. Am. M. Ass.* 1941; 16: 1307.

Before active treatment of injuries to the hand is undertaken, it is of great importance that an exact diagnosis and a careful analysis as to the cause, location and extent of the lesion be made. The anatomy of the hand is complex and difficult yet an accurate knowledge of it is necessary for the diagnosis of hand injuries. The author describes various diagnostic tests based on functional anatomy.

Injuries may be divided into four main groups depending on whether tendons, nerves, bones or blood vessels are involved. It is important to obtain if possible an exact account of how the injury was sustained. Human bite wounds are particularly dangerous from the infection standpoint.

Injuries to the flexor tendons occur most commonly on the fingers and wrist while lesions of the extensor tendons occur usually over the dorsum of the hand. An orderly examination of the function of the fingers should be made in suspected tendon injury. Hurried probing and clamping of bleeding vessels without adequate aseptic precautions should never be done.

If the flexor digitorum profundus tendons are severed, the patient is unable to flex the distal phalanges when the proximal phalanges are fixed. The diagnosis of severed sublimis tendons is more difficult since the profundus tendons are capable of flexing all the interphalangeal joints. Infection under operating room conditions will usually disclose whether or not the sublimis tendons are severed. Inability to flex the distal phalanx of the thumb with the proximal phalanx fixed indicates a rupture of the flexor pollicis longus tendon. Division of the flexors of the wrist weakens wrist flexion and produces lateral deviation in accordance with which flexors are involved.

The true test of an extensor tendon injury is the inability to perform extension of the phalanges with the metacarpophalangeal joint extended; otherwise, with the metacarpophalangeal joint flexed, the lumbricals can produce extension of the interphalangeal joints. Rupture of the extensor tendon from the distal phalanx produces the characteristic flexion deformity. Rupture of the extensor pollicis longus produces loss of the power of extension of the distal phalanx of the thumb with weakness of adduction and abduction and loss of the medial border of the anatomical snuffbox.

The nerves supplying the muscles of the hand are the median and ulnar. Laceration of flexor surfaces of the wrist or palm often is associated with injury to these nerves. The best test for the integrity of the median nerve is as follows: with the palm facing up, and the patient should lift the thumb directly towards the ceiling, which action is produced by the abductor pollicis brevis. Loss of the function of the median nerve also produces anesthesia roughly over the thumb and the ventral surfaces of the index, middle and one half the ring finger together with the radial side of the palm. The test for ulnar function is the ability to spread the extended fingers (interosseous muscles). Anesthesia develops over the fifth finger and one half of the fourth finger together with the adjacent surface of the palm and dorsum of the hand in injury of the ulnar nerve. The radial nerve supplies no hand muscles but injury higher in the arm produces the characteristic paresthesia of the wrist drop. Anesthesia develops over most of the radial side of the dorsum of the hand when the sensory branches are injured.

Signs and symptoms of injury to bones and joints are fairly characteristic and diagnostic

The diagnosis of injuries to tendons and nerves of the hand is made by certain functional tests based on a knowledge of the anatomy of the hand

LUTHER H. WOLFE, M.D.

Kolodner, I. Immediate and Late Results of Primary Amputation of the Limbs. *Chirurgja*, 1940, 6: 86

This author discusses 175 patients on whom 211 amputations were done for injuries sustained in traffic accidents. The majority of these patients were seen within thirty to sixty minutes following the accident. The criteria for radical management were based on the extent of injury to the blood supply and the degree of contamination in the wound. Injuries of the soft parts in the entire circumference or of the vascular bed and nerve supply were thought to endanger the life of the limb much more than bone injuries *per se*.

The author states that amputation with shock is still a questionable issue but advises shock-combating measures immediately, though not longer than three hours because of the danger of increasing the severity of the shock by the absorption of toxic products from the point of injury. He suggests that this absorption might be avoided by the clamping of afferent vessels, or by the use of the tourniquet proximal to the injury. He states that postoperative shock was diminished by avoiding the use of general anesthesia. The amputation was done at the site which would provide the most useful stump. The amputations of choice were the conical circular or the circular incision with or without lateral incisions. Because of generally poor conditions, the osteoplastic amputation was impossible in the majority of cases.

Of 14 amputations of the upper extremities, 9 were of the upper arm and 5 of the forearm. Of 197 amputations of the lower extremity, 82 were femoral, 96 were of the lower leg, and 19 were of the foot. One hundred and thirty-seven conical circular amputations were done. Twenty-five flap amputations, 12 atypical, 1 Pirogoff, 1 Beir, and 31 Gritti-Stokes' amputations were done. No sutures were used in 68 cases. Twenty cases and all those which had undergone osteoplastic procedures were closed with two or three sutures and drained. In 86 cases the edges were approximated with one or two sutures.

The author attempts to predict the optimum mortality and morbidity rates of such treatments from these results. Twenty-one patients (12 per cent) died, 27 had local infection, but healing took place. Fifteen had to have the sutures removed to permit the drainage of serum. Seven had postoperative bleeding. Another 7 had necrosis of the flaps. Three patients developed decubitus ulcers over the tibia. Of 154, 21 returned for re-amputation. Seventy-eight with 82 stumps were followed-up for one and one-half to four years. Thirty-four of these patients had no complaints. The most common complaint among the others was that of phantom-

limb pain. Stumps which bore weight painfully usually had bad scars as a result of poor healing and wound infection. The author points out, however, that even these stumps can be made comfortably functional with plastic measures.

(SCHÖBER, HAMBURG) RUDOLPH W. RAWSON, M.D.

Zikeev, V. The Treatment of Penetrating Knee Joint Injuries by Extension (Die Behandlung durchdringender Kniegelenkverletzungen durch Dauerextension). *Chirurgja*, 1940, p. 116

Penetrating knee-joint injuries are frequent in war in peace time they occur most frequently among woodsmen. The author reports on 35 cases which he treated during the past ten years. Among them there were only 4 bullet wounds, the others were as blows or penetrations by foreign objects. He considers it as typical that the injured generally come for medical attention late, usually between the third and fifth day. The injury is usually considered of a minor nature and only after infection has set in is the seriousness of the condition recognized.

In all cases extension was employed for the entire time and this resulted in complete healing in 15 cases, in healing with moderate limitation of mobility in 11 cases, and in ankylosis in 5 cases. Amputation had to be performed in 2 cases, and 2 deaths resulted. After employment of extension it could be observed that the general condition of the patient rapidly improved, the pain decreased, there was a drop in temperature and improvement in the wound with decrease of the pus and a gradual change to a serous secretion.

The author recommends the employment of prolonged extension for all neglected or delayed cases, but states that fresh cases, i.e., cases seen in the first few hours after injury, should be treated by primary wound debridement and primary suture. The traction weights vary from 4 to 8 kgm.

(B. HESS) LEO A. JUCHKOFF, M.D.

Hetzar, W. The Avertin Treatment of Tetanus (Zur Avertinbehandlung des Tetanus). *Zentralbl. f. Chir.*, 1940, p. 1097

Magnesium sulfate produces muscular relaxation but is dangerous to the respiration and circulation. Moreover, the injections are painful and stimulate additional mild attacks of convulsions. However, avertin anesthesia, suggested by Laewen, is a rectal anesthesia and avoids these dangers. It is simple to administer, well tolerated, and does not damage any organ by prolonged use. This is true also in children. Hetzar emphasizes as most important the favorable influence upon the respiratory spasms. Avertin relaxes the spastic contractures of the respiratory musculature and promotes and alleviates respiration. It was surprising that in 3 of Hetzar's 4 cases, right after the anesthesia, the respirations became more peaceful and the patients fell into a calm deep sleep without excitation.

At the Clinic in Königsberg they do not hesitate to administer the anesthetic 3 or 4 times daily. In

the meantime the patient is fed normally without a stomach tube. Cramps of the stomach musculature are not observed. They give 0.1 gm. of avertin per kgm. of body weight as a maximum dose. Children receive one half of this or even less. In general they begin with small doses. However they continue to give avertin until the last symptoms have disappeared. In the cases at the Clinic this was twenty-one, twenty-three, sixteen and twelve days. The total quantities were for one child 37 doses or 51.24 gm. for the first adult 59 doses or 259.6 gm. for the second adult 41 doses or 128.5 gm. and for the third adult 22 doses or 110 gm. Cardiac stimulants were also given.

They do not take the viewpoint that serum therapy is unnecessary as a few cases from the Polish campaign and those of Bromer which were cured with avertin alone may perhaps indicate. They feel that serum can act only on newly produced local toxins and not on those that are firmly fixed in the central nervous system.

During the first few days they give from 1000 to 25000 units intravenously and intramuscularly later only once intramuscularly. They do not give the serum intraspinally because by this method there is greater danger of excitation. They also give it locally but in the experience this was not of great importance. They inject very slowly or desensitize the patient previously with a small dose. Sheep or cattle sera are customarily used. In one case an anaphylactic reaction occurred after the first and second injections but this was controlled with camphor, cardiazol and caffeine. Usually calcium or glucose was injected along with the serum.

The total quantities of serum used were in the child 140000 units and in the adults 500000, 200000 and 800000 units (intravenously) along with 280000, 680000, 400000 and 400000 units (intramuscularly). The 4 patients all recovered. The incubation periods amounted to eight days, ten weeks and five months until the occasion of a subsequent operation at which time tetanus serum was not given once. The last 3 cases were gunshot injuries. Only 1 of the patients besides the child had not had primary vaccination. It is of interest that a gunshot injury amputation was done before the onset of the tetanus. In spite of this however local tetanus appeared after an interval of four weeks and general tetanus after ten weeks.

(FRANZ) EDWARD W. CIBS M.D.

Killian H. Gas Gangrene and Blood Vessel Injury
(Gibson and Gifford's review) D. is he
Zi 1 f Ch r 94 53 674

The onset of gas gangrene infection occurs in such a manner that the causative bacteria form a to which produces hemolysis and necrosis and in this way produce the suitable fertile soil for the increased growth and consequently increased formation of poison. Usually however in the everyday wounds which are so frequently infected with anaerobic organisms gas gangrene infections do not have to

be reckoned with because too small numbers of bacteria are introduced and therefore there is no extensive toxin formation. The circumstances are otherwise however if a wound of the large blood vessels is present for then the natural defenses of the body are influenced adversely to a great extent. The author discusses first a case of gas gangrene in the presence of an arterial embolus which has only one counterpart in the world literature.

In a forty-seven year old patient who gave a history of joint rheumatism in the past an embolus of the right femoral artery below Poupert's ligament occurred. The embolus was removed by operation from the markedly sclerotic vessel. However complete restoration of the circulation did not occur and after forty-eight hours severe gas gangrene developed in the cold lower leg. It was not possible to save the patient's life by the disarticulation at the right hip joint which was done because of the involvement of the musculature of the thigh.

The operative measures required in 5 other cases of gas gangrene with blood vessel injury are then described. In a nineteen-year-old butcher who had stuck a knife through his right artery and blood vessel while at work ligation of the former and implantation into the latter were necessary to reestablish the circulation. In this case the gas gangrene occurred first in the right upper arm and a blood transfusion was given then in the right lower leg for which amputation was done. Putrid infection of the sutured blood vessel wound developed with erosion and hemorrhage and death occurred from generalized infection. Gas gangrene bacteria (Fraenkel) were not found. The probable source of infection was the knife, the skin or a six weeks previous lymphadenitis of the right groin.

The same unfortunate outcome occurred in the next case of femoral vessel wound from a knife wound below Poupert's ligament in the upper portion of the adductor canal in an eighteen-year-old butcher. At first suture seemed a complete success but on the following day there appeared the signs of beginning gas gangrene in the right lower leg. In this case also prompt thigh amputation of the thigh did not stop the infection. In the third case there was also a knife wound in a twenty-year-old patient. Suture of the severed femoral artery in the adductor canal brought complete success but the wound was left open and irrigated with Dakin's solution.

A sixty-two-year-old patient who besides other wounds had a compound fracture of the left radius with simultaneous tearing of the cubital artery from a dislocated elbow succumbed to a gas gangrene infection. The Welch Fraenkel bacillus was present on culture.

The last case was that of a thirty-eight-year-old patient in whom progressively enlarged skin wound occurred after tearing of the brachial artery from a machinery accident. The artery was sutured and gas gangrene developed. It terminated at amputation of the upper arm at a half an inch breadth above the elbow joint brought recovery.

In conclusion, the author comments once again in spite of the previous failures, on the fundamental importance of assurance of the arterial blood flow through the sown vessel combined with the restoration of an adequate circulation by means of blood transfusion, because without these many instances of gas gangrene contamination established through open wounds must be reckoned with.

(MAX BLOOM) JOHN K. PAIN, M.D.

Einaudi, M. Chronic Myositis and Tendosynovitis Due to Staphylococci (*La miosite e la tendosinovite cronica da stafilococco*). *Ufficietti*, 1937, 10:20 31-154.

Einaudi reports a case of chronic myositis of the left quadriceps and one of chronic tendosynovitis of the extensor of the left index finger, both due to the staphylococcus aureus and characterized by the absence of fever and of marked general symptoms and, locally, by an anatomicopathological picture similar to that of a tumor. The second case was especially interesting because of its rarity. In the case of myositis the muscular infection was secondary to a staphylococcal cutaneous lesion, but no point of entry was found in the case of tendosynovitis, in which a previous traumatism may have acted as the determining or predisposing agent. Chronic staphylococcal infection of the muscle is characterized by the presence of a small amount of pus surrounded by a wall of connective tissue which has a tendency toward sclerosis and is lined internally with inflammatory granulations. The abscess is located inside of the muscle and the peripheral reactive sclerosis may be so intense as to give rise to a hard swelling—the so-called circumscribed sclerosing myositis if it is surrounded by muscular substance or the diffuse form if the sclerosis extends to the entire muscle. In the sclerosing process the pus is usually reduced to a few drops. The same aspect is assumed by the chronic staphylococcal processes which involve the tendons, and the proliferating hyperplastic reaction occurs in the tendon sheath.

The reported cases presented a diffuse sclerotic process with fibrous tissue of a gray yellowish color and hard lardaceous consistency which gradually decreased toward the surrounding tissue and left the limits of the latter indistinct. In some small zones the tissue had a tendency toward necrosis because of vascular compression and thrombosis. The aspect of this proliferating myositis and tendosynovitis is common to all specific and non specific inflammations. Among the specific forms should be mentioned particularly tuberculous tendosynovitis with such an abundant hyperplasia of the sheath as to simulate sarcoma or myeloma, careful histological examination alone can determine its nature. In non specific chronic myositis, the muscular fibers left behind by the inflammatory process are interlaced in all directions by connective tissue strands, while in tendosynovitis there is an abundance of condensed fibrous bundles mixed with young round cells coming in part from the migratory elements and in part from the

fixed elements of the tissues. accumulations of polymorphonuclear leucocytes foci of liquefaction and purulent infiltration are seen here and there, but the fibrous tissue undergoes only in part the progressive involution of the usual cicatricial tissue and shows instead a tendency toward pseudomorphous connective tissue hyperplasia. The absence of the specific characteristics of syphilitic, tuberculous, and actinomycotic forms suggests a basal inflammatory process due to the action of the staphylococcus. Microscopically there are no signs to differentiate with certainty the non specific and specific pseudomorphous inflammations from sarcoma.

The disorder always begins insidiously, and a feeling of tightness or some spontaneous pain calls the patient's attention to the involved part as a rule, there is no increase in temperature. The initial period may last several weeks or many months. The functional disturbances depend on the volume and location of the swelling. The skin looks and feels normal and is adherent to the involved muscle or tendon; at times it becomes edematous and painful. The disorder shows a predilection for the quadriceps muscle and for the extensor tendons of the hand—the pectoralis major, the triceps—and the biceps are less frequently involved. The prognosis is favorable and the treatment is always surgical.

RICHARD KEVET, M.D.

Kev, J. A., and Frankel, C. J. The Local Use of Sulfanilamide, Sulfapyridine and Sulfamethylthiazol. *Ann. Surg.*, 1937, 113: 284.

The authors discuss the rationale behind the use of sulfonamide compounds locally in the prevention of infection in traumatic wounds.

While it is true that none of these drugs has a high bactericidal capacity against staphylococci, clostridium welchii, and other potential contaminants and while all are of limited effectiveness in local lesions in the concentrations obtained by systemic routes of administration, it seems possible that the very high concentrations obtainable with local implantation would permit of significant degrees of bacteriostasis against even resistant organisms. Sulfanilamide will yield concentrations in wound fluids of over 1,000 mgm. per cent and sulfapyridine and sulfamethylthiazol concentrations of about 200 mgm. per cent. In experiments *in vitro* Kev and Frankel observed that these concentrations produced marked delay in the growth of cultures of staphylococci and clostridium welchii, and saturated solutions of sulfanilamide were definitely bactericidal against hemolytic streptococci. These authors attempted to determine the ability of these drugs when used locally to prevent the development of infection in compound injuries in animals which had been grossly contaminated with staphylococcus aureus. In experiments of several different types they were unable to show any clean cut superiority of condition of wounds containing local sulfonamides when compared with that of wounds in which the drug was not used. Thus they failed to confirm the observations reported by

Jensen, Johnsrud and Nelson (*Surgery* 1939 6:1) who observed a marked reduction in the incidence of infection in wounds in which sulfanilamide was placed.

The authors carried out a number of experimental studies designed to indicate whether local sulfonamide implantation would interfere with wound healing. They found that the introduction of these drugs in compound fracture wounds, before closure, in the joints and serous cavities produced no significant alterations in the character of wound healing. Wound irritation was least apparent, however, with sulfanilamide, and they attribute this to the fact that being soluble, this drug produces less foreign body reaction than the comparatively insoluble sulfapyridine and sulfamethylothiazol.

Although their clinical observations are not discussed in this article, in their conclusions the authors advocate the local implantation of local sulfanilamide powder in contaminated wounds and in clinically clean operative wounds in which infection is anticipated as a possible complication.

In the discussion, Kellogg Speed reported favorable results with the local use of sulfanilamide powder

in amputation wounds in septic cases. Frank McLeney pointed out that experimental studies designed to indicate possible prophylactic effectiveness in compound fractures of local sulfonamide therapy should be performed with mixtures of potential contaminants instead of pure cultures. Furthermore, the factor of soft part injury as an aggravating factor in infections in traumatic clinical cases should be kept in mind in designing experimental studies.

Owen H. Wangersten commented on the apparently successful employment of sulfanilamide powder applied to the suture line for the prevention of peritonitis following anastomosis of the intestines.

Henry F. Graham mentioned the highly successful application by Garlock and by Ravdin of sulfanilamide administered by mouth or subcutaneously in the prevention and treatment of peritonitis due to intestinal organisms. He pointed out that while the local use of sulfonamides may be valuable, there remains some doubt as to whether the local use of these drugs is to be preferred to systemic administration.

JOHN S. LOCKWOOD, M.D.

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Brailsford, J F Cysticercus Cellulosæ—Its Roentgenographic Detection in the Musculature and the Central Nervous System *Brit J Radiol*, 1941, 14 79

The life history, development, distribution, incidence, and microscopic characteristics of cysticercus cellulosæ are outlined. The initial symptoms of infestation are seldom recognized and there is a long latent period after infestation until the cysts are recognized by roentgenography or as subcutaneous nodules. The cysts of cysticercus cellulosæ cannot be recognized roentgenographically until there has been calcification within them.

In 1925 Brailsford reported the demonstration of calcified cysticerci in a patient in whom there were multiple calcareous deposits in the musculature. The appearance of these areas of calcification bore a resemblance to that of fallen teardrops and they were first thought to be artefacts. The long axis of these bodies was in the direction of the muscle fibers of the affected area. At that time there was no mention of the roentgenographic demonstration of such cysts in the English literature, but the roentgenographic appearance of these parasites in human muscles had been described by several German authors.

In roentgenographs of the body the majority of the cysts are in the connective tissue of the musculature of the pelvis, the thighs, the walls of the thorax, and the upper arm and calf muscles. It is unusual to see more than three or four cysts in the hand or foot, and often none are present. In the roentgenographs, calcified mature cysts are seen as ovoid opacities measuring 14 mm by 7 mm. Some variation in shape and size is due to the angle of projection and the distance from the film. In the early stages of calcification the cysts appear to be larger and more elongated than later, and the calcium is irregularly deposited. The appearance suggests that the calcium rendering the parasite visible has first been deposited in the fluid contents of the cyst around the scolex. With age the cyst increases in density, becomes more flattened and, although there is only slight diminution in length, the width is usually about 3 mm. The margins are often irregular except at the ends, which are usually rounded. This is the form which persists throughout the life of the patient. In association with these large calcified mature cysts there are often others which are smaller, some may be about the size of a small pin head and are indistinct in outline. These smaller opacities do not exhibit the regular form seen in the mature parasite.

Brailsford believes that the roentgenographic appearances are due solely to the deposition of calcium first within the fluid contents and later in the degenerated remains of the parasite. Ultimately some



Fig 1 Roentgenograph of leg showing cysticerci with varying degrees of calcification. In the larger calcified nodules the lighter uncalcified scolices can be seen. In the smaller, i.e., the less calcified cysts, the calcium has no definite shape, and on dissection of these the calcium was found to be surrounding the scolices.

calcium may be deposited in the cyst wall. The process of calcification of the contents of the parasite does not take place so readily in the brain as in the musculature. The differential diagnosis of cysticercus cellulosæ from sarcosporidia trichinosis and tuberculous sclerosis is considered.

Figure 1 is the roentgenograph of a leg which demonstrates cysticercus cellulosæ infestation with calcification. In the larger calcified nodules the lighter scolices which are not calcified can be seen. The indefinite shape of the smaller calcified cysts is well demonstrated.

HAROLD C OCHSNER, M D

Shanks, S C Mass Roentgenography of the Chest, et al (Faculty of Radiologists Presidential Address) *Brit J Radiol*, 1941, 14 45

The war has brought mass roentgenography into prominence because it may serve to detect lesions in apparently healthy individuals whose enlistment would be harmful to themselves and their comrades, would impair the efficiency of the service, and would be an unnecessary drain on the public purse. Of the methods available for this purpose, the usual complete roentgenological investigation is impractical because of the expense, time, and medical personnel involved, while screen examinations alone are unsatisfactory because they are not entirely accurate.

and provide no permanent record for possible future comparative needs. Miniature roentgenography or screen photography obviates these objections and provides a practical method for large numbers.

The techniques with German, Dutch and British types of apparatus are described in detail. A scheme for a national system of examination of recruits for the services is also suggested. Actual operation is discussed in connection with the technical teams involved, accommodations for the units for fixed or mobile requirements and processing, reporting and storage of the film. Attention is called to the fact that positive findings revealed by the miniature films ought not be relied on entirely for rejection of a recruit, but should be checked by complementary clinical and roentgenological investigations.

It is emphasized that mass roentgenography can be successful only if a satisfactory and uniform standard of quality is maintained and if uniformity is adopted in the diagnostic criteria which are applied in the interpretation of the films. For this purpose a central control to organize an optimum routine technique and keep a constant check on the results obtained is a prime essential.

ADOLF HARTUNG, M.D.

Robinson W. W. Oral Cholecystography. The Basis of Standardization of the Method. *Radiology* 94:1 36 3.

It is the purpose of this article to discuss and record the essentials of a rational and carefully planned oral administration of substances found on the recognition of known fundamental principles which will produce satisfactory cholecystograms in as short a period of time as may be consistent with thoroughness and yet give a high percentage of operative confirmation as well as reduce the negative error in these examinations to a minimum.

Since cholecystography is primarily an index of the functional activity of the gall bladder and its ducts, it must be based upon strict observance of this physiology to be dependable. The gall bladder must fill, concentrate, change in size and empty to constitute a normal cycle. These factors are dependent respectively upon (1) a closed sphincter of Odd, (2) a normal gall bladder mucosa and (3) contractility of the intrinsic musculature of the gall bladder wall. These factors are discussed along with clinical and experimental evidence to justify procedures recommended for a standardized technique. Correlation of cholecystographic study with the gastro-intestinal series of examinations is of distinct value in reducing the negative error of interpretation to a minimum for which reason the two methods of study are usually combined in the routine examination.

The essential details of this technique consist of and are discussed under the following steps:

1. Preliminary roentgenograms of the gall bladder area prior to cholecystography.
2. A fat meal three hours preceding administration of the dye.

3. One dram of paregoric thirty minutes prior to administration of the dye.

4. Four grams of sodium tetraiodophenolphthalein with 4 oz. of fruit juice.

5. One dram of bicarbonate of soda one hour after the dye.

6. The first series of roentgenograms twelve hours after the dye.

7. Opaque meal and roentgenograms of stomach and duodenum immediately following the twelve hour cholecystograms.

8. The second series of roentgenograms sixteen hours after the dye.

9. A fat meal and roentgenograms fifteen, thirty and sixty minutes later.

10. Studies of the colon in relation to the gall bladder with or after these examinations.

Variations of this technique under special circumstances are given consideration and minute descriptions of each step are included. Attention is called to the fact that a precise and exacting technique from the roentgenographic standpoint in making the cholecystograms is essential for obtaining accurate findings. That used by the author is described in detail. In conclusion it is stated that except in cases of persistent or pernicious vomiting from any cause and in obstructive lesions of the pyloric outlet of the stomach, intravenous cholecystography is seldom indicated.

ADOLF HARTUNG, M.D.

Stenstrom B. Cholangiography (Ure Cholangiography). *Acta Med Scand* 191 2 549.

Stenstrom states that it is always important to decide whether an icterus is of hepatic, biliary or extrahepatic origin. With the aid of various laboratory tests and the consideration of the symptoms of the patient, the clinician succeeds at times in getting a good idea about the nature of the icterus, but the disease picture often remains obscure and in many cases roentgen examination does not afford any help for the etiologic diagnosis of the disorder. Even at operation, it is frequently difficult to clear up the question. However, a new method has been proposed lately by which any changes, especially in the cholelithiasis but also in the hepatic duct, can be demonstrated directly by roentgen representation of the biliary tract after its injection with opaque substance. This is the so-called cholangiography, of which there are two kinds: the primary and the most important, which is performed during the operation and in which the opaque substance is injected into the gall bladder, the cystic duct or the choledochus and the secondary, in which the opaque substance is injected through a catheter installed in the gall bladder or the biliary tract during a pre-operative operation. This presupposes strict collaboration between the surgical and roentgenological departments of the institution and requires special installation in the operating suite.

As it is necessary to obtain a sharp picture, the patient must be capable of holding his breath and local anesthesia is therefore indicated in the perineal and

PHYSICOCHEMICAL METHODS IN SURGERY

splanchnic forms of anesthesia are generally used. Various opaque substances have been recommended by various authors, but the substances should be soluble in water, and there is no doubt that those which are employed for intravenous urography are the most appropriate and are absolutely harmless. Thorough knowledge of the normal anatomy of the biliary tract is indispensable. The pathological processes which can be demonstrated by cholangiography and eses which can be demonstrated by cholangiography are stones in the efferent biliary tract, strictures and tumors in the choledochus, external pressure on the choledochus especially by pathological processes in the pancreas, spasms of the sphincter of Oddi, and anomalies, such as supernumerary biliary ducts.

At the Maria Hospital of Stockholm, cholangiography has been performed 72 times in 57 patients: the number of the primary cholangiographies was 44 (7 under general and the remainder under spinal anesthesia) and that of the secondary ones 28. For this purpose, a cassette holder was built, large enough to receive a 24 by 30 cm film, and was placed transversally on the operating table and under the patient, who was turned slightly to the right in order to avoid projection of the choledochus on the vertebral column. A strong, portable roentgen unit was used which gave satisfactory pictures with from 85 to 90 kV, 30 ma, and 3 or 4 seconds exposure. Thorotrast was injected in the first 47 cases, and then perabrodil in 9 and abrodil in 16. The 20 per cent abrodil solution gave good contrast, and it is relatively cheap. In the primary cholangiographies, the cystic duct was injected 12 times, the common hepatic duct once, and the choledochus 31 times. In the secondary cholangiographies, the injection was made through the drain into the gall bladder 9 times, into the choledochus 17 times, and into the common hepatic duct twice. The clinical diagnosis in all cases was stone in the biliary tract. The roentgen diagnosis was stone in 23 cases, suspected stone in 3, spasm in 2, air bubble in the biliary tract in 2, stricture of the choledochus in 1 case (demonstrated by autopsy and histological examination to be due to cancerous growth), and a completely normal picture in 38 cases.

The author concludes that eventual pathological changes in the choledochus may be revealed in most cases by cholangiography if the proper technique is employed. Therefore he advises the use of this method when it is desirable to demonstrate alterations in the excretory biliary tract during the course of an operation.

Bourne, N W, and Hefke, H W Body-Section Pyelograms in Children *J Urol*, 1941, 45 296

The authors believed that the diagnostic quality of excretory urograms in children might be improved by some modification of the technique which would overcome the problem of indistinct gas shadows. Tomography or laminography, which is the roentgenographic representation of body sections, was suggested by Hefke as the solution of the problem. This method permits the reproduction of certain

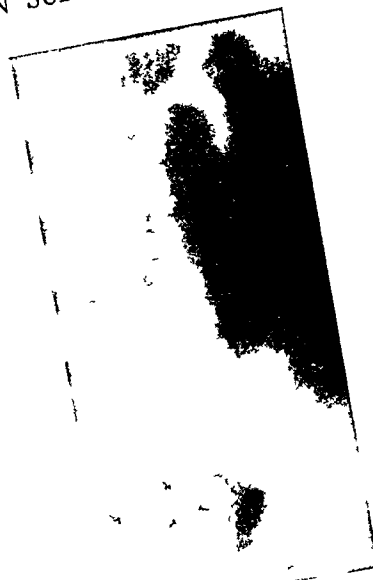


Fig 1 Body-section pyelogram. Note large hydro-ureter with a stone in its lower third which had not been recognized in routine x-ray examination because it was overlying shadow of sacrum.

layers of the body with elimination of shadows of other layers which may lie above or below the desired level.

The authors' routine preparation of infants or children for excretory urography has been with castor oil, licorice powder, enemas, and no breakfast. If the single film of the abdomen showed too much gas in the intestines, pitressin was given in doses of from 5 to 10 units hypodermically. Diodrast was administered intravenously 10 c cm was given to infants and young children, and from 15 to 20 c cm to children above six. Films were taken ten minutes after intravenous injection, during which time compression was used over the pelvis. The second film was taken soon afterward and after removal of the compression. If the urograms were satisfactory, and this was true in approximately 50 per cent of the cases, no further films were deemed necessary.

When there was a considerable amount of gas in the stomach, small intestines, and especially the colon, body-section roentgenography was resorted to. The fulcrum of the laminograph carrier arms was adjusted to a point about 2 cm above the table top, in young children about 3 or 4 cm above the table top. In all children the exposure was not more than one second. Two more films were taken at a level of 1 cm above or below the first level.

Three cases are reported in which this method was of definite value. In the first it permitted adequate visualization of the renal excretory system despite the presence of excessive amounts of gas. In the third patient a stone was found in the lower ureter.

this had not been visualized previously. There was marked dilatation of the ureter which had not been well demonstrated in the routine pyelogram. These findings are well illustrated in Figure 1.

The conclusion is reached that most of the unsatisfactory intravenous pyelograms can be made into good diagnostic roentgenograms by the use of the simple procedure of body section roentgenography.

HA OLD C OCHSNE M D

Seids J V and Hauser H. An aneurysm of the Splenic Artery. *Radology* 94 36 71

Aneurysm of the splenic artery is uncommon and difficult to diagnose during life. Within recent years a few cases have been reported which were correctly diagnosed preoperatively. Occasionally the diagnosis is established at operation but usually post mortem examination first reveals this condition. Consideration is given to the incidence, symptoms and signs before and after rupture, pathology and treatment.

In the diagnosis the presence of a palpable pulsating tumor with a systolic bruit in the left hypochondrium is helpful. Calcification in the walls of the aneurysm makes possible roentgen recognition of the lesion. A ringlike shadow of calcium density with less dense mottling in the center is a characteristic finding on the plain roentgenogram. Aneurysm of the left renal artery and other calcified lesions in the left hypochondrium may be excluded by the use of contrast urograms and gastrointestinal studies.

Two cases with roentgen findings are reported in detail. One was operated upon by proximal ligation of the splenic artery with cure. The other case was asymptomatic and discovered by routine roentgen examination of the spine. ADOLPH HARTUNG M D

Bullo E. Statistical Results of a Decade of Radiation Treatment of Tumors of the Tonsils. (*Risultati statistici di un decennio di radioterapia tonsillare*). *Tumor* 94 26 45

Bullo states that the frequency of tumors of the tonsils is rather high as they occupy third place among the tumors of the oral cavity. This seems to be due in part to the fact that consecutive tissue tumors occur in the tonsils more frequently than in the other parts of the mouth. The first difficulty arising in a study of tumors of the tonsils is that of determining exactly the site at which the primary tumor has started. Most cases come for treatment when the tumor is already in an advanced stage. Another difficulty is that of the histological classification of some neoplastic forms.

From 1928 to 1937 inclusive 107 cases of malignant tumors of the tonsils were admitted to the National Institute of Tumors in Milan. There were 74 epithelial tumors and 28 connective tissue tumors. The patients with carcinomatous forms belonged to the fourth, fifth and sixth decades of life. While 6 of the patients with sarcomatous forms were less than thirty years old. Of the 107 patients 22 (21 per

cent) remain cured after an observation period extending from a minimum of three years to a maximum of twelve years. Immediate cure was obtained in 63 cases (61.6 per cent) while in 33 there was only a temporary improvement or the tumor continued its progressive development. If the cured patients are excluded the remaining ones show the following results: 16 have been lost from sight or have died from various causes, 57 (55 per cent) are not cured because of persistence of the primary tumor with or without lymph node involvement and 7 (6.7 per cent) were cured of the primary tumor but not of the lymph node involvement. Therefore the number of patients lost through metastasis only is not high and shows that the principal problem is that of the cure of the primary tumor but in order to improve the possibilities of final cure it is necessary that the treatment be given while the tumor is still limited to the tonsil. However it is a fact that in most of the cured cases of this series the tumor had already exceeded the limits of the tonsil. Among the 22 cured patients the carcinoma group accounted for 15 (20 per cent) and the sarcoma group for 7 (5 per cent). These results are largely in agreement with those of other authors and are even better if the material of the first years is excluded which was composed mostly of patients beyond the limits of curability. The last five years show 33 per cent of cures.

The palliative as well as the final results have been about the same for carcinoma and for sarcoma. It was noted that even in grave cases of sarcoma it was possible to obtain brilliant and surprising results at first but that they were soon followed by fatal recurrence. The treatments used have varied from case to case in accordance with the histological type of the tumor, its extent and the presence of metastases. In general the classical treatment has been used for carcinoma: adjuvant implantation of the primary tumor, surgical excision of the lymph nodes and radium irradiation of the lymphatic territory with a modelled apparatus for sarcoma. Only roentgen treatment or radium irradiation with a modelled apparatus has been used. The prognosis is rather favorable as long as the tumor is still limited non-infiltrating and without metastasis. In cervicofacial metastasis was found in about half of the cases of carcinoma and in nearly all those of sarcoma.

RICHARD KEMPE M D

Snell G D. Induction by Roentgen Rays of Hereditary Changes in Mice. *Rad* 1 27 941 36 89

In one experiment of the author male mice were given x-ray therapy in dosage which ranged from 200 to 1600 roentgens and were subsequently mated to normal non-radiated females. A dosage of from 600 to 800 roentgens proved most suitable under the conditions of the experiment. The technical factors other than total dosage are not given.

Males will produce little or no offspring about two weeks after irradiation before they become sterile. Litters bred during this period are reduced in size with a

dosage of from 600 to 800 roentgens the litter size is approximately one-half the normal. The offspring of such irradiated males by normal, untreated females were, in turn, mated to normal, untreated mice. Numerous small litters resulted, and it was found that one-third of the immediate offspring produced these small litters. This tendency in irradiated stocks has been named "semi-sterility", it is transmitted to about one-half the offspring of every semi-sterile mouse, and its appearance does not depend on inbreeding.

X-rays are known to produce two types of hereditary changes.

1. Gene mutations, or changes in the submicroscopic hereditary unit which give the familiar 3 to 1 mendelian ratios. The author has found no evidence that this type of hereditary change is produced in mice.

2. Chromosome mutation, or a loss of whole segments of chromosomes with all their genes, which constitutes the commonest genetic effect of γ -rays. One type of chromosome mutation is translocation. An individual carrying this type of mutation appears to be perfectly normal but its breeding behavior is

altered, when mated to a normal unrelated individual it produces six classes of offspring, only two of which, in animals, are viable. The two viable classes are like the two parents, one carries the translocation, the other is entirely normal.

As far as the transmission of "semi-sterility" is concerned the observed behavior is in accordance with the predictions. To test the production of non-viable embryos, normal females were mated to semi-sterile males and killed about twelve days after mating. Their uteri contained three classes of embryos: (1) those already dead and beginning to degenerate, (2) living animals with abnormal brains due to failure of closure of the anterior end of the neural groove, and (3) entirely normal embryos. Abnormal young rarely come to term.

Emphasis is laid on the fact that abnormal embryos and abnormal young due to translocation do not appear until the second generation following irradiation. Consequently, clinical studies of the immediate offspring of irradiated animals are without significance in this connection. Their appearance does not depend upon inbreeding.

HAROLD C. OCHSNER, M.D.

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Crane M M and Woods P W A Study of Vitamin C Nutrition in a Group of School Children *New Eng J Med* 94: 2 4 503

Determinations of the plasma ascorbic acid in the blood of 86 children living in a Maine village were made in the autumn of 1938 and again in the spring of 1939. It was found that 55 per cent had significantly low values and that such children often had gingivitis which could often be relieved by the administration of ascorbic acid. A high correlation was found between the single plasma ascorbic acid value and a vitamin C tolerance test depending on the immediate excretion of ascorbic acid in the urine after a test dose of 400 mgm.

The authors conclude that Vitamin C deficiency appeared to be a factor in the production of the gingivitis observed in these children.

PAUL STARR MD

Bomskov C and Milner G On the Question of Participation of the Thymus in Myasthenia Gravis Pseudoparalytica (Über die Funktion des Thymus und der Myasthenie) *Deutsche Zeitsch f Ch* 94: 54 99

The presence of a pathological muscular weakness can be diagnosed by Jolly's positive myasthenic reaction and also by the fact that this reaction can be eliminated by injecting prostigmin. Jolly's reaction consists of a procedure which determines electrical weakness of the muscles. According to the opinion of the authors, the importance of the myasthenic reaction has been greatly overestimated. Pathological muscular weakness is also observed in connection with Basedow's disease. Because of the fact that the muscular weakness usually subsides after extirpation of the goiter, most investigators have denied the participation of the thymus in this clinical picture while others—Adler in particular—have upon the basis of clinical observations surgical results and animal experiments considered the thymus of causal importance in the clinical picture of myasthenia gravis.

The authors state that the red scovary and present status of the specific thymus hormone put them in a position to check with more accuracy than other authors the question of a participation of the thymus in myasthenia. In their experiments they did not use dogs but rats and guinea pigs altogether 20 rats and 30 guinea pigs were examined. Adlers statements that clinical muscular weakness was induced by the injection of an aqueous extract of the thymus were not confirmed in the rat. Mistakes in the experimental procedure were excluded. Neither in the rat nor in the guinea pig did the specific thy-

mus hormone produce myasthenic manifestations; it was not capable of inducing myasthenia even after extremely large doses. The authors on the other hand explain the muscular weakness with a semi or partial participation or altogether with a primary participation of the cortex of the adrenal gland. As we know that injuries to the cortex of the suprarenal gland are also associated with Basedow's disease the authors consider the pathological muscular weakness in this clinical picture easy to comprehend. Therefore the cortex of the adrenal gland is in the center of the entire myasthenic problem which is also true in the classical type of myasthenia—namely the adynamia of Addison's disease. Consequently Adler's conception is rejected by the authors.

(St DE PLASSMA N) HILDA H WHEE ER

Loeb L The Significance of Hormones in the Origin of Cancer *J Nat Cancer Inst* 1940 1: 69

The progress of our knowledge of the rôle of hormones in the production of cancer particularly in the period since 1916 is reported. The constant rate of incidence of hereditary spontaneous mammary cancer in mice was at that time shown to be decreased by removal of the ovaries to a degree depending upon the stage of development the mice had reached at the time of spaying. The ovaries as hormones which is necessary for the development of these tumors is estrogen. The tumors may become apparent however long after the estrogen ceases to act. Mammary cancers of this type can be produced by prolonged injection of estrogen in mice of a susceptible strain but not in mice of a non-susceptible strain.

Transplantations of the anterior hypophysis into female mice of a high tumor strain causes an increase in the incidence of cancer. If this is done in female of a low tumor strain great mammary proliferation occurs but no cancer and if done in males or spayed females no breast changes take place. This suggests that the anterior lobe of the hypophysis acts through the ovaries to stimulate the mammary gland. Whether cancer develops from this or not depends on the hereditary susceptibility of the animal.

As a characteristic of tumors due to hormones or to ordinary carcinogenic compounds which affect an organ diffusely the change in cancer is gradual and multicentric. The normal cells probably progress toward cancer step by step and not by the occurrence of sudden mutations.

The dose of estrogen used in the production of these tumors controls the percentage of mice in the group which will be affected and the length of time which will elapse before the tumors develop.

The benign adenoma of the mammary gland of the rat is common and easy to study. The author has studied it chiefly by observing its behavior on

MISCELLANEOUS

transplantation Transplants are successful if the host is of a susceptible strain and has a favorable hormonal pattern Testosterone may inhibit the success of such a transplant Serial transplants of these tumors may succeed in developing a sarcoma but not a carcinoma

The hereditary factor must act with the hormonal factor in the production of cancer The mother strain is more important than the father strain in determining the tendency to tumor formation The difference between various strains may be tremendous This is not due to the amount of estrogen normally secreted, nor to the readiness with which estrogenic hormones are destroyed or eliminated in the individual animal There is an inverse ratio in mammary cancer between the amounts of stimulation and hereditary factor needed

Estrogens can produce carcinoma or precancerous changes in the cervix and vagina, the latter more frequently than the former Different species react differently to the same stimulus Estrogen administrations may cause hyalinization in the uterus of the mouse but fibromyomas in that of the guinea pig Fibrous tumors may be found elsewhere in the body after such injections, and injections of luteal hormone or liver extract may have a somewhat similar effect Other tumors which may develop under the influence of estrogen are lymphoid tumors and lymphatic leucemia

So far, formation of cancer has been proved to occur from only estrogenic hormones and anterior pituitary transplants Antihormones may cause a refractory state in the animal The manner in which the hormones are brought to influence the organism theoretically has some import Those mechanisms which make for the steady, continuous action of hormones increase their carcinogenic effect Those which tend to make their actions rhythmic or cyclic or which tend to develop refractory states to hormone action decrease this effect

RICHARD WARREN, M D

Pricolo, V A Contribution to the Study of Malignant Tumors of Children (Contributo allo studio dei tumori maligni dei bambini) *Tumori*, 1940, 26 287

Among a total of 6,673 cases of malignant tumor admitted from 1928 to 1939 to the National Institute for the Study and Treatment of Cancer in Milan, Pricolo found 28 (0.04 per cent) in children up to the age of twelve years He gives a brief description of these cases which included 1 basocellular carcinoma, 1 malignant rhabdomyoma, 2 retinal gliomas, and 24 sarcomas

The basocellular carcinoma was observed on the right nasal ala of a child aged eight years and was the only epithelial tumor found in childhood as against 6,413 tumors of this type found in adults The age of the patient and the appearance of the tumor on the fusion line of the face support the theory of the dysontogenetic origin of these epithelial neoplasms

Rhabdomyoma, whether benign or malignant, is very rare The histological diagnosis of malignancy in the present case seemed to be confirmed by rapid recurrence after surgical intervention The recurrence was partially excised and then treated with radium the child is apparently cured two years after this treatment

Of the 2 children with glioma of the retina, 1 died shortly after the operation and the second seemed to be cured by combined surgical and radium treatment, at least for the period of about one year during which the child was under ambulatory control

Among the 24 cases of sarcoma, there were 8 of the soft tissues (muscle, aponeurosis), 9 of the bones, 3 of the organized tissues (kidney, thyroid), 3 of the lymph nodes, and 1 sacrococcygeal chordoma Nine of the cases were undoubtedly complicated by metastases to the lymph nodes, bones, and lungs The total number of sarcomas observed for all ages at the Institute was 254 This tumor was more frequent in male than in female children and its maximal occurrence was found between the ages of ten and twelve years 10 of the 24 patients were of this age A direct connection of trauma with the appearance of bone sarcoma was established in 2 cases only

Neoplastic heredity could be affirmed with certainty in 3 of the 28 cases of tumor, but it must be remembered that the parents of the children were still far from the usual cancer age, which is between fifty and sixty years Taking into account the incidence of malignant tumors in childhood and in advanced age, respectively, one may conclude that the heredity found in the present cases is high

The mortality was high among the sarcomatous forms 14 children died within a few weeks of their admission Information could be obtained about 5 of the 10 remaining children 2 are living three years after their discharge from the Institute, 1 is living one year after his discharge, and the 2 others have died Among the 28 cases admitted, 11 were considered to be beyond the limits of curability and 17 were given therapeutic treatment as 3 of the children are still living, the survival is about 11 per cent The percentage of survivals is directly connected with the period of appearance of the disorder at which it was possible to institute an effective treatment The fact that 11 of 28 cases were too far advanced for treatment when coming under observation in a region in which there is a special institute for the treatment of tumors reveals how regrettably late these patients are sent in for diagnostic confirmation Undoubtedly, this is partly due to the greater difficulty of early diagnosis of the tumor in children than in adults

RICHARD KEMEL, M D

Anderson, W A D Disease in the American Negro Melanoma *Surgery*, 1941, 9 425

Various observers have noted that melanoma, in either the benign or malignant form, occurs in the negro race with relative rarity The author found only 10 cases of malignant melanoma in negro patients among 14,000 surgical specimens at the

John Gaston Hospital in Memphis Comparative statistics indicated that the same type of lesion occurred slightly more than four times as frequently in the white race. Thus the observation concerning the rarity as corroborated by the present studies.

In 5 of the 10 cases reported the melanoma occurred in the foot in 2 it occurred in the fingers and there was 1 case each with the eye, hip and leg as the site of origin. In 6 cases there was a definite history of associated antecedent trauma. In 3 cases the tumor had a subungual origin. In 7 of the 10 cases the growth originated from regions of the skin which normally contained relatively little pigment which may have some bearing on the cause. In only 1 case did there seem to be a pre-existing benign lesion.

Microscopically the tumors appeared identical with malignant melanomas found in white patients. The tumors varied markedly in the amount of pigment they contained.

The author points out that the incidence of benign pigmented tumors in the negro race has never been investigated seriously and further suggests that the investigation of the relative incidence of tumors arising from structures of the peripheral or central nervous system may reveal significant facts.

LUTHE H. WOLFF, M.D.

DeCholnoky, T. Malignant Melanoma. A Clinical Study of 117 Cases. *Am. Surg.* 1941, 13, 39.

A clinical study and an analysis of 117 cases of malignant melanomas are reported. Melanomas include pigmented or non-pigmented tumors of the skin and mucous membranes, supposedly of nervous origin. Etiologically they may develop insidiously from a brown, black or bluish pigmented spot but frequently they develop after irritation or trauma even from the unpigmented end organs of peripheral sensory nerves. The common mole, with or without hair, may be the site of malignant change. Melanomas are more common in women. The youngest patient in this series was fifteen months and the oldest seventy-eight years; the predominate age group being from forty-five to sixty years.

The anatomical distribution in this series was: head 40 per cent, lower extremities 26 per cent, upper extremities 15 per cent. The tumor spreads first by direct extension and reaches the regional lymph nodes through the skin lymphatics; then it invades the capillaries of the involved nodes. Blood stream invasion may occur directly.

The first symptoms are often a feeling of irritation, inflammation, itching or hurting in a hitherto symptomless nevus. It may weep, bleed or adhere to the clothing. It increases in size, becomes raised or tumescent and a black spot may appear at the middle or periphery. The soft cellular nevus gradually becomes resistant and infiltrated. It is invariably fatal if not controlled by surgery or possibly by irradiation. The average duration of life is one and one-half to three years. Death seems to occur more quickly in the young.

With regard to prophylaxis it is just as important to prevent improper treatment or irritation of pigmented lesions as it is to excise surgically those subject to irritation. Chemical irritation or caustics and electric method which do not totally eradicate the lesion should be avoided. The generally accepted treatment of these tumors is surgical. Early, radical excision with dissection of the regional lymph nodes even if none are palpable is advocated. Local recurrence is more effectively controlled when there has been a previous lymph node dissection. Radical excision of the primary lesion with the underlying fascia and surrounding subcutaneous tissues including its lymphatic area followed by regional lymph node dissection is the choice of treatment. Amputation is advocated for melanomas of the fingers, toes and foot if the lesion is on the heel and for anatomical reasons when connective tissue bands go perpendicular from the skin to the peroneum. An analogy is drawn between the spread of melanoma of the fingers and the spread of pyogenic infections to tendon sheath, periosteum and bone. Radiation under present technique is not recommended as sole treatment.

In 81 cases verified by pathological examination operations were performed upon 75 patients. Patients which could be followed up totalled 60 of which 36 were alive after from three months to thirteen years and 24 succumbed after 5 months to eleven years. None of the patients with melanoma on the foot lived free of the disease for more than five years. The author believes that lesions on the head are more benign in their clinical course because they are less subject to trauma. The five year cures totalled 42 per cent and the ten year cures 19 per cent in this series. JOHN L. LINDBQUIST, M.D.

Liberti, R. Does the Acute Virulent Lymphogranuloma Exist? (*Esiste il linf. granul. m. lym. ac. t?*) *P. I. R. me.* 94, 48, med. 3.

Virulent lymphogranuloma is considered by many authors as a condition with a slow and protracted course. This disease has a chronic course lasting from two to four years. Reed and Mayer mention some cases lasting more than seven years and Stockman mentioned 1 which lasted twenty years.

Although the acute virulent lymphogranuloma is rare, some cases have been reported. The diagnosis was myocarditis, lymphatic leucemia, tuberculous of the lymphatic nodes, acute degeneration of the cord muscle, hemorrhagic edema, infectious cholangitis and cryptogenic sepsis. It is not possible to give a detailed clinical picture of acute lymphogranuloma which may be classified as a subacute form.

Michel gives the following symptoms:

Slow onset, anorexia, diarrhea, abdominal distention, spontaneous pain and pain on palpation with distubances of the innervation and regulation of the intestine in relation to the retroperitoneal mass.

MISCELLANEOUS

of the granuloma, but on account of the septic condition

Wolfson, S. A., Reznick, S., and Gunther, L.
Early Diagnosis of Malignant Metastases to the Spine
J Am Med Ass, 1941, 116: 1044

When roentgen evidence of metastases is demonstrable in the spine the lesion is far advanced and the optimum time for treatment has passed. It has been shown by others that the spongiosa of the vertebral body can be almost entirely replaced with metastatic tissue without abnormal roentgenological findings. In fact, only when at least 1 sq cm of the cortex of the vertebra has been destroyed will the lesion be detectable with the x rays. For this reason the authors urge that the diagnosis of malignant metastases to the spine be made on certain clinical and laboratory data in order that symptomatic relief might be obtained early with adequate roentgen therapy.

The early diagnosis of spinal metastases is made on (1) the character of the pain, (2) the increase in erythrocyte sedimentation, and (3) the elevation of serum phosphatase.

The pain produced by metastatic lesions is a root type of pain, i.e., it is usually limited to definite segments, and it is aggravated by coughing, sneezing, straining, bending, and jarring. The pain is constant and intense. The patient is reluctant to move once a relatively comfortable position is attained. Percussion tenderness over the involved vertebra is constantly present. In contrast to the above symptoms, the pain associated with spinal osteo-arthritis usually has a wide area of distribution, it varies in intensity, percussion tenderness is not present, and the patient is constantly turning and changing positions because motion affords relief.

The erythrocyte sedimentation rate is almost invariably increased when metastases exist, and usually it is greatly increased. This change takes place quite early and is a constant and dependable sign.

The elevated serum phosphatase, when present, is considered a significant finding. The phosphatase is almost always elevated when osteoblastic activity, which results from certain metastatic lesions, is present. With osteoclastic lesions the serum phosphatase may be normal, but is frequently elevated. Interval determinations of the phosphatase levels are advocated as a steady rise is of particular significance.

The authors believe that if a patient has, or has had, a proved primary malignant lesion and complains of a root type of pain, with findings of an elevated sedimentation rate, and/or an elevated serum phosphatase, a diagnosis of malignant metastases of the spine may be made irrespective of the roentgenological findings, and roentgen treatment should be instituted.

Four case reports illustrating the various diagnostic points are presented in detail.

LUTHER H. WOLFF, M.D.

- 2 Intermittent or remittent fever, recurrent or undulant, or recurrent undulant fever
- 3 Intermittent anemia with leucopenia, without eosinophilia, and with monocytosis and organic decav
- 4 Enlargement of the liver and of the spleen, intermittent in character slight and occasionally severe jaundice. The hepatosplenomegaly is intermittent in character and more marked during the exacerbations
- 5 Positive but not constant diuresis
- 6 Possible late appearance of superficial glandular foci
- 7 Seldom very severe insistent irritation of the skin

The author reports 1 case of virulent lymphogranuloma of thirty days' duration with a febrile and septic picture, and insufficient clinical symptoms for the establishment of a correct diagnosis. The sixty-year-old married patient was admitted to the hospital with a history of twenty days of high and continuous temperature without particular troubles. The general condition soon became worse with poor circulation of the blood, a dry and coated tongue, and a dry pharynx. The negative result of clinical tests and the presence of a painful tumefaction in the right lumbar region, as well as leucocytosis, raised the suspicion of a pararenal abscess. At the operation the roundish and painful mass appeared to be localized in the right lobe of the liver, which was swollen and presented grayish spots. The patient died in a septic condition. The post-mortem examination showed a virulent splenohepatoganglial lymphogranulosis with abdominal localization. The lungs were pale. The liver was enlarged especially the right lobe and was soft with a gray-yellowish color, the cut surface presented gray spots and many granular nodes which gave to the tissue a marbled appearance. The spleen was enlarged in volume and consistency, the splenic pulp showed small whitish yellowish nodes and a large yellow mass. From the past history of the patient it appeared that one year before she had complained of anorexia, weakness, and increasing emaciation. This may prove that the patient came to the hospital in the acute stage of the disease. In the opinion of Ziegler the lymphogranuloma is a histopathological form which needs a careful clinical examination for diagnosis. The lymphogranuloma may appear in different forms: plasmacellular, eosinophilic, and neoplastic.

Favre and Croizat divide the clinical course of the disease into three stages: initial, static, and healing stages. The second stage can be divided into an inflammatory or exudative phase and a pseudo-neoplastic or productive phase.

All of the acute forms reported in the literature and the case of the author may be referred to the second, the pseudoneoplastic or productive phase. The inoculation of lymphogranuloma fragments into the guinea pig reproduced the disease perfectly. In the successive phase, however, the affection became so serious that the guinea pigs died, not on account

Tino zi F P An Angioblastic Sarcoma Originat
ing in Granulation Ti sue (Su di un sarc ma
 a nobil ti so t su te s t di gra laz i)
 R g nter d cl ter p 940 81

There has been a great deal of discussion of tumors resulting from trauma. The author presents a case bearing on the question.

The patient was a man of fifty five who about a year before he came for examination had suffered a severe lacerated and contused wound on the middle third of the left leg. He treated it himself simply by bandaging for a time after which it was left uncovered. It did not begin to cicatrize for about three months and during this period there was a scanty yellowish exudate and frequent hemorrhages. When the wound was only partly cicatrized a little fleshy swelling appeared in it and gradually grew until it reached its present size that of a mandarin slightly flattened in the anteroposterior diameter. When he came for examination the patient was in good condition reactions for syphilis and tuberculosis were negative. The tumor was movable on the underlying bone. It was slightly less hard than contracted muscle. Under local novocaine anesthesia it was removed together with a large area of the surrounding skin. Recovery was uneventful. Histological examination showed angioblastic sarcoma.

The author discusses the possible reasons for the development of a tumor in the granulation tissue of a wound. Very evidently in this case there was an etiological relationship between the trauma and the tumor. It is possible that in tissue subjected for a long time as in this case to alternative and reparative processes substance appear which stimulate the tissues to neoplastic growth. In this case contributing factors to such tumor producing irritation were the neglect of the wound its slow healing the repeated hemorrhages and the fact that there was probably a mild pyogenic infection during the slow process of healing. **ANDREW C MOGAY MD**

GENERAL BACTERIAL PROTOZOAN AND PARASITIC INFECTIONS

O'Neara R. A. O. A New Concept of the Toxemia of Diphtheria. Why Modern Antitoxin Fails—Activity of Antitoxin—Toxin-Antitoxin Action.
Lancet 1941 4 205

Attention is called to the failure of modern antitoxin to cope with diphtheritic intoxication as effectively as did the early antitoxin. Comparison of the chemical results obtained shows that in the development of antitoxin some essential factor has been missed.

The author presents a new concept of the nature of diphtheria toxemia and of successful specific treatment. Diphtheria toxin is composed of two substances A and B. The former highly lethal for the guinea pig and present in large amounts in Park Williams No. 8 toxin is produced only in small amount in the body of the diphtheria patient although it has been assumed that excessive amounts are

responsible for hypertoxic diphtheria. The latter although present in small amount in laboratory toxin is responsible for hypotoxemia. Substance B promotes the penetration of the tissues by substance A and when present in excess leads to great increase in size of the local lesion in the accompanying gelatinous edema in the necrosis produced and in the tendency for wasting and paralysis later.

In antitoxin there are two corresponding antibodies. Ordinary antitoxin contains a high proportion of the antibody to Substance A but is deficient in antibody to Substance B. Use of this type of antitoxin in hypertoxic diphtheria fails to produce neutralization of Substance B. Dissociation of toxin from its combination with antitoxin occurs on dilution in the body and the toxin continues almost unabated. The effectiveness of antitoxin depends on its power to neutralize Substance B. The treatment of the toxemia requires antitoxin rich in the antibody to Substance B. **WALTER H. NADLER MD**

Roseman E. and Aring C. D. Encephalopathy Associated with Sulfamethylthiazole Therapy.
New England J. Med. 1941 24 416

A syphilitic negro who worked as a shaker in a lead factory was given heavy dosage of sulfamethylthiazole for lobar pneumonia and died on the sixth day in the hospital. Autopsy showed hemorrhagic encephalopathy with the focal perivascular hemorrhages confined to the gray matter of the cerebral hemispheres and the nuclear structures of the brain stem. **PAUL SRA MD**

DUCTLESS GLANDS

Paillos K. von. Organic Changes in Rats Treated with Masi e Do's of Synthetic Estrogenic Substance. The Toxic Effects of Synthetic Estrogenic Substance (Organic and Rube).
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 oestrge Stoff b ba d l t w r n D tousehe
 W k g d yn th t ch oe tr g e St ff)
 A h f G, aek 1940 7 372

The claim made by various authors that severe toxic effects were produced through the use of synthetic estrogenic substance induced this author to test the effects of 8 different estrogenic substances on the liver, kidney, suprarenal gland and the stomach of rats and to compare the effect with those following the use of natural follicular hormone and olive oil which was employed as a vehicle. The experimental animals were given the various substances from twenty eight to thirty two days orally or subcutaneously in daily doses of 1 mgm.

After the administration of the synthetic substance there occurred in the liver an extensive glycogen depletion and further a fatty degenerative change involving and extending from the central zone of the lobule to the periphery. There was observed in the kidneys a fatty deposit in the epithelial cells of both the straight and convoluted tubules. To be sure the same manifestations were observed

MISCELLANEOUS

after follicular hormone and olive oil administration, but to a lesser degree.

In the opinion of the author the effects can be considered toxic only when the toxicity is widespread and observed in many experimental animals. Liver necroses or changes which point to a toxic parenchymal injury of the liver or to the presence of icterus, in contrast to the findings of other observers, were not noted.

The synthetic estrogen caused a marked degeneration of the lipid-containing cells and a marked dilatation of the capillaries of the suprarenal cortex. Hemorrhage into the cortical substance was also observed. Natural follicular hormone exercised a similar effect, with the exception of the hemorrhage. All of the described changes were reversible.

In a supplement reference is made to a recently published work of Kreitmair and Sieckmann, in which it is stated that estrogenic substance up to 10 mgm daily was administered to rats for thirty days, and likewise no necrosis or icteric changes in the liver or kidneys, as described by Gumbrecht and Loeser, could be confirmed. As an essential toxic effect, these authors found an irreversible fall in erythrocytes and hemoglobin, however, up to the present time this applies only in the case of dogs.

(TSCHERNY) H. HOFFMAN GROSSMANS, M D

Mark, J., and Biskind, G. R. The Effect of Long-Term Stimulation of Male and Female Rats with Estrone, Estradiol Benzoate, and Testosterone Propionate Administered in Pellet Form. *Endocrinology*, 1947, 28 465

The authors report extensive studies on the changes that occur in the endocrine and genital organs of male and female rats under the influence of pellets of estrone, estradiol, and testosterone propionate.

Intact females treated with estrone pellets show cornified vaginal smears for long periods interspersed with short periods of anestrus. Estradiol pellets produced similar changes. Precancerous breast changes occurred in one rat and definite adenocarcinoma in another.

Castrate female rats showed continuous vaginal cornification for an average of one hundred and fifty-four days following the introduction of one estrone pellet. In this group large colloid-filled thyroid acini lined with cuboidal cells were noted. Testosterone propionate pellets in adult female rats for thirty-six days produced diminution of ovarian, uterine, adrenal, and hypophyseal weights, inhibition of ovarian cycles and absence of corpora lutea. A similar group of rats which received testosterone propionate for fifty days followed by a period of one hundred and eighty days to allow substitution to normal showed anestrus and disappearance of the hormone. At the termination of the experiment corpora lutea were present in the ovaries and the organs were normal in weight and microscopic structure.

Estradiol benzoate and testosterone propionate given simultaneously to thirty day-old females produced squamification of the vaginal smears for an average of one hundred and twenty-seven days. The hypophysis proceeded to enlarge. The same effect was noted in females who were previously pregnant and who were treated with estrone and testosterone propionate. The ovaries showed infantile follicles and no corpora lutea. The anestrus state in the castrate female rats was not altered by testosterone propionate.

In thirty-day-old males testosterone propionate and estradiol resulted in marked testicular atrophy. In adult males the atrophy was likewise marked and involved particularly the spermatogenic elements. The changes in organ weights and microscopic structure occurring in adult male rats following testosterone propionate administration are reported.

In these experiments about 59% of testosterone propionate were absorbed per day and only 7.0% of estrone. The rate was not affected by the site of introduction, the physiological need of the animal, or the simultaneous introduction of both pellets.

JOHN A. GRES, M D

Greene, R. R., and Brewer, J. I. The Relation of Sex Hormones to Tumors of the Female Reproductive System. In *J. Roertgen et al*, 1947, 45 426

This article constitutes a detailed review of a large volume of literature. Estrogens have a definite influence on the formation of true tumors in certain experimental animals, there are, however, species and intra species differences. There is also an important quantitative factor. On a weight-for-weight basis, with the dosage used by many workers to induce carcinoma of the breast in the mouse, a human female would have to be given about 17 mgm of estradiol benzoate daily to produce a similar lesion. The monkey, which is much closer to man than most of the other experimental animals which have been used, has exhibited no malignant breast changes after the administration of very large daily doses of estrogens. Treatment in many of the experimental animals must be extended over a long period of time, in the mouse, the period represents from one-tenth to one-half of the total life span of the animal.

Experimental work with carcinoma of the breast has demonstrated that estrogens are important in the development of breast carcinoma only in those strains of mice in which carcinoma of the breast appears spontaneously. There is little evidence that estrogens will induce carcinoma of the breast in the rat. In the human female, proof of the etiological importance of estrogens in the development of carcinoma of the breast is lacking, although many reports suggest that an interrelationship exists. There are divergent opinions in regard to the importance of roentgen castration in carcinoma of the breast in menstruating women. Trout, however, has reported 15 patients in whom one breast was removed for carcinoma and who later became preg-

nant. Thirteen of these developed carcinoma in the remaining breast and 12 died promptly.

Epithelial changes have been produced in the cervix of experimental animals with estrogens. Some epithelial changes have been observed in the human female apparently the direct result of estrogenic substances. Although there is suggestive evidence that estrogens have produced carcinoma of the cervix in the mouse this is not true in any other experimental animal. There is very meager evidence that estrogens are a factor in the development of carcinoma of the cervix in the human female.

Both experimental and clinical evidence indicates that endometrial hyperplasia and squamous cell metaplasia are the direct result of estrogenic stimulation. There is no evidence however that estrogens have produced carcinoma of the endometrium in experimental animal. Despite the suggestion of numerous clinical reports of a close association between estrogenic stimulation of endometrial tissue and the development of carcinoma in these tissues there is no definite evidence that such an association exists in the human.

Fibromyomas have been produced in guinea pigs and rabbits by the administration of estrogens but lesions have not been produced in other experimental animals. There is some evidence that in the human being estrogens are effective in the development of fibromyomas and endometriosis. There is evidence that the estrogens are essential for the growth of these lesions once they are established.

The authors conclude that the cause of certain tumors in certain animals has been definitely established. They include among these causes the administration of certain doses of estrogens for certain periods of time in the production of special tumors in the mouse rat guinea pig and rabbit. They do not believe that there is sufficient evidence to establish that any one factor such as estrogens is the sole important etiological agent in the production of malignant or non malignant tumors in the human female.

HAROLD C. OCHSNER, M.D.

HOSPITALS MEDICAL EDUCATION AND HISTORY

Fifty Years of Surgery. Review of the Fiftyth Anniversary Number. *Am J Surg* 1941 51: 308

The American Journal of Surgery in the issue of January 1941 commemorates its fiftieth year of publication. First published under the name of the American Journal of Obstetrics and Gynecology at Kansas City, Missouri, its name was changed fourteen years later and it since has become one of the standard American surgical periodicals. The editors now look back on these fifty years and find that an era replete with important events and trends with which to endow this number. The contributors to this volume are known to all American physicians and the editors have wisely given them a wide latitude to deal with their subjects in an authoritative manner. Granted that the past fifty years certainly surpasses

any other period in the development of American medicine this issue then becomes a work of contemporary medical history.

The medical educators of the era fighting ignorance and selfishness both within and without the profession wrought a great change which served as the background for much of the progress of this period. The many student fee supported medical schools are gone and the schools of today are integral parts of universities supported by endowment whereby the student actually pays only a small part of the cost of his education. These endowments serve for the maintenance of laboratories, libraries, distinguished professorships, university hospital, and the like—all developments of this period.

Ray Lyman Wilbur, long a writer in the field of medical education, looks back on the process that made this change possible and after reviewing them warns that such forces are labile forces which will continue to require the thought and guidance of those responsible for this phase of medicine in the next era.

The evolution of the surgical internship is discussed by the Dean of Long Island Medical School, J. A. Curran. Beginning with the early days of the period under discussion, he speaks of the trial of newly graduated students in the attempt to perform the surgery required in their practice. Most of them worked immediately upon their graduation from medical school and a rare few were skillful and artful enough to become surgical specialists. Later years it became apparent to many that this was as unsatisfactory to the doctor and to the profession as it was at times to the patient and the general trend toward internship and advanced training in the specialty got under way. It was Halsted at the Hopkins group, Curran tells us, who gave the long term surgical training its first impulse. It has developed now to the point where surgical organizations, namely the American College of Surgeons and the American Board of Surgery, together with the other specialty boards are taking an active interest in the student who indicates his desire for advanced training in any field. Lists of approved residents are available and it is now possible for most of the Board applicants to have attained the requisite training.

Mata and Heyd, in writing of the evolution of surgery and its work, strike the same vein in which a number of doctor books were written for lay comprehension during the past few years. Mata of course has practiced surgery actively during the entire era under discussion and the narrative first person style in which he writes this chapter adds enjoyment to the benefit one derives from reading it.

Few of the readers of this Journal or of any other have failed to be influenced in one way or another by the origin and progress made by the specialty boards. Beginning with the formation of the American Board of Ophthalmology in 1916, Paul T. Tus, Secretary of the Advisory Board for Medical Specialties, reviews the circumstances re-

lating to the formation of these societies, and the role that the fifteen of them are playing in current medical practice. The surgical societies, both exclusive and inclusive kinds, have been important factors in the development of American Surgery. The largest of these, and perhaps the one with activities which touch the daily life of most doctors, is the American College of Surgeons. Michael Mason explains the tempestuous origin of the College and outlines its organization and the scope of its many activities. The American Surgical Association and the Southern Surgical Association are described by prominent members of each of these societies. The Central Surgical Association, newly organized by the surgeons in the central United States and the adjacent Canadian Provinces, held its first meeting just after the publication of this volume and hence is not mentioned.

What has transpired in the field of hospital administration in the past fifty years is told by Blue-stone of New York. The response of hospitals to surgical and economic changes of the era has brought this phase of medical practice into the category of big business. The changes wrought in the hospitals by the demands of the specialties is another interesting feature described by him.

Whatever field of surgery the reader holds pre-eminent, he will find its history and development outlined in further chapters written by eminent authorities in each section. This commemorative volume thus offers the busy practitioner a contemporary history of surgery, and since all too few opportunities are given us to read of the cultural phase of our profession, it should be on the "must" list of every physician.

JAMES K. STACK, M.D.

Hunter, J. B. The Emergency Medical Service and the Future. *Brit M J*, 1941, 1, 326

The Emergency Medical Service in the Ministry of Health was developed early in 1939 to meet the special conditions that were expected to arise in this war. The Hospitals War Committee, comprised of members of the staff of the London teaching hospitals, combined with the Voluntary Hospitals Committee to join with the Ministry of Health to arrange for medical care under war conditions. The result was the division of London into 12 Sectors, with one teaching hospital in each to control the whole sector. The rest of England was divided into Regions, each independent of each other, so that all districts could function separately if cut off from the rest of the country. A number of E. M. S. hospitals were included in each Sector and were staffed to a certain extent by doctors and nurses from the dominating teaching hospital. Hut hospitals had to be built about a nucleus of pre-existing hospitals, many of them previously mental institutions. The problems of additional beds, equipment, and staff under expanding needs had to be solved. Arrangements had to be made for rapidly transporting casualties not only from the scene of incident but also for inter-hospital evacuation, so that central hospital beds could be kept available in the event of air raids.

The experience of the E. M. S. in the present emergency has brought a new conception in medical service, viz. the decentralization of the treatment of urban sick. The purpose would be to minimize overlapping and reduplication of many services in the urban centers, where the poor are well cared for, and to set up adequate hospital service in the country districts. The doctor will have to assume executive authority in the regional scheme rather than leave measures for improved health to lay committees.

A broad outline of the regional scheme is as follows:

A series of small urban hospitals with full out-patient departments in the urban districts, outside of these districts in the country, one or more large central hospitals providing accommodation and facilities for all specialties and dealing only with the acute sick on the same pattern as the large voluntary hospitals that we know today. Further afield, depending on geographical circumstances, a number of satellite hospitals receiving the more chronic type of cases, and in each region convalescent homes for children and adults. The acute case would be dealt with at the urban hospital, but would be transferred as soon as possible. Some large central body would be created to pool the financial resources of the various hospitals and so link them up with the regional scheme.

Since surgery plays an important part in a scheme such as this, the necessity for the maintenance of high standards for the qualification of men in surgery is paramount. The surgeon must lead in the reconstruction of the present hospital set-up.

EDWIN J. PULASKI, M.D.

Korbuly, G. Semmelweis, in the Notes of His Contemporaries (Semmelweis, in den Aufzeichnungen seiner Zeitgenossen). *Orvosképekés*, 1940, 30, 625

Because the intimate friends of Semmelweis passed away early, and also perhaps because he lived estranged from many competent personalities whose duty it might have been to remember him after his death, we are scarcely informed about the private life of this great man. In the statistics of the City of Budapest it is reported that he left no personal property. His *Open Letters* which were published in the Hungarian Journal *Orvos*: *Heti Lap*, created hostile feelings in his colleagues, and his own pupil, Josef Fleischer, remarked in his memorial speech, "his aggressive nature destroyed every success", he was not even liked by his pupils.

Later, Reznárožky, Professor of Gynecology at the University, remarked that Fleischer was practically the only one who remained a follower of Semmelweis' doctrine through a period of years. In the year 1870, Johann Ambró, Director of the Institute for Obstetric Midwives in Pozsony, loudly proclaimed the doctrines of Semmelweis and discussed them in the preface of his book which was published in the Slovakian language.

All manuscripts of these doctrines have been lost and only 5 of his many letters are preserved in the original among them is the letter which he addressed to the Hungarian Academy of Science in 1800 in which he reported that he had succeeded in discovering the real cause of the dreadful disease and how to prevent its occurrence. An English letter accompanying his principal work which he sent to his friend and follower Charles Routh in England is of interest. The Hungarian psychiatrist Professor Schaffer recently deceased remarks in his book *The Psychic Life of Semmelweis* that his personality represented a mixed type—a crossing between a cycloid somatic and a schizoid psychic type.

Years passed after Semmelweis' death before he was acclaimed abroad. Kussmaul remembers him affectionately in his *Memories of the Youth of an old Physician*. Siebold was one of his good friends but in spite of this fact Semmelweis wrote to Siebold later: "Your doctrine leads to the murder of women in confinement and since I have irrevocably decided to end this murder I shall openly oppose your murderous errors." In 1890 one of his pupils in Budapest wrote in the technical journal *Gyógyászat* the following about Semmelweis: "His lectures were not systematic. His interest was centered in his dis-

covery and therefore he skipped everything in his lectures in order to quickly reach the opportunity to discuss puerperal fever. His pupils were not informed on the basic ideas of obstetrics and therefore they could not become interested in the further progress of this science. His lectures took place in front of empty benches."

His nephew Professor Mueller wrote about him: "Whenever possible he explained to everyone with growing excitement the infallibility of his theories; he would stop his colleagues on the street and refute his adversaries with a loud voice." His faithful friend Markosovszky recognized his greatness and also wrote about him: "His pupil Fleischer expressed his feelings regarding Semmelweis in his Memorial Speech in these words: 'He was the best, most honest, most noble human being, friend and colleague.' His friend and follower Charles Routh wrote in 1906 on the occasion of the unveiling of the Semmelweis Monument: 'I feel that few great men like he lived in the field of our science. It hurts me deeply that some failed to appreciate him now, however his discovery is approved by every physician. We know now that no one loved his patients better than he, who fighting for truth sacrificed everything.'"

(FELIX GAL) HILDA H. WHEELER

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SURGERY AND THE BASIC SCIENCES

THE APPLICATION OF RECENT CONTRIBUTIONS IN BASIC MEDICAL SCIENCES TO SURGICAL PRACTICE

THE PERIPHERAL CIRCULATION INCLUDING THE LYMPHATICS

SMITH FREEMAN, Ph D , M D , and FRED S GRODINS, M S , M B , Chicago, Illinois

BLOOD

DURING recent years, there has been an increasing interest in the circulation of the skin and extremities. Such studies are of physiological as well as of clinical importance, since they provide an insight into the behavior of the peripheral vessels under a variety of normal and abnormal conditions and point the way to the more rational management of peripheral vascular diseases.

The methods employed in the study of the peripheral circulation have recently been reviewed (1, 2, 3). Burton (1) describes three general methods for the study of peripheral blood flow. Direct microscopic observation of the capillaries is limited in the human being to the vessels of the nail bed. The technique developed by the Clarks (4) for the direct observation of the vessels in the rabbit's ear has recently been employed by Seldon and Lundy (5) to study the effect of various anesthetic agents on the peripheral vessels. This method should find wide application.

The second general method involves the recording of volume changes or volume pulsations in the vessels of the skin and extremities. In the simple plethysmograph, changes in the volume of the part which is enclosed in a suitable container are recorded. Such changes in volume are assumed to be due solely to changes in the blood content of the part. The method is obviously limited to skin

areas which can be enclosed in an appropriate container. Various recording systems have been used, the older mechanical piston recorders having been replaced more recently by water or air transmission recorders such as described by Goetz (3) and Johnson (6), or by optical methods such as recently described by Wright and Phelps (7). The fact that the absorption of light by a trans-illuminated tissue varies with its blood content has recently been employed to detect vascular changes with the photo-electric cell. Numerous such photo-electric plethysmographs have recently been described (3, 8, 9, 10, 11, 12). Hertzman (8) discusses the method in detail and points out various sources of error which must be avoided. One of these sources of error is the influence of the ratio of reduced hemoglobin to oxyhemoglobin on skin opacity. To obviate this difficulty, Gross, Matthes, and Goepfert (11) employ two photocells simultaneously. One, recording in the ultrared, represents a pure plethysmogram of the blood content because in this region of the spectrum, reduced hemoglobin and oxyhemoglobin transmit the same amount of light. The other cell, recording in the visible red region, represents changes in oxygen saturation because in this region reduced blood transmits much less light than oxygenated blood. The advantage of the photo-electric method is the fact that it can be applied to a wide variety of skin areas and does not require enclosure of the part in a container.

The question arises as to the interpretation of plethysmographic records of this type in terms of

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vascular reactions. The first type of record which is obtained by such plethysmographs is the so called volume pulse. This represents the difference between arterial inflow and venous outflow during a single cardiac cycle. Provided cardiac output and blood pressure remain constant the magnitude of the volume pulse apparently depends upon the tone of the small arteries and arterioles and hence is a measure of arteriolar tone (3, 8, 13). The volume pulse has also been used as an index of vascular tone by Burton (14, 15). According to Goetz (3) and to Hertzman (8) capillary and venous pulsations probably do not contribute to the volume pulse although the latter author does not entirely eliminate this possibility. Burton (1) however states that the pulsation in the skin originates mainly in the capillaries. This has a bearing on the interpretation of the volume pulse in terms of blood flow. Since blood flow is determined chiefly by the state of the small arteries and arterioles the volume pulse should give an indication of blood flow if it also depends chiefly on arteriolar tone. That such is the case under certain conditions is indicated by Burton (1, 14). However he points out (1) that variations in venous and capillary pressure may greatly alter the volume pulse without appreciably affecting the flow and that therefore the volume pulse cannot always be taken as an indication of the volume flow. Hertzman (8) regarded the volume pulse as an indicator of arterial flow. Later Hertzman and Dillon (13) used the volume pulse as a direct measure of arterial tone and the product of volume pulse amplitude and heart rate as an indicator of flow in an attempt to analyze arterial, venous and flow components in photo-electric plethysmography.

In addition to volume pulse record such plethysmograms also record changes in the total volume. The latter depends upon the blood content of the capillaries and veins (1, 3). Since changes in total volume may be the result of changes in arterial inflow, venous outflow or both one cannot interpret every volume increase as representing an increased arterial flow or vice versa. Ferris and Abramson (2) observed for example a decrease in forearm volume associated with an increased blood flow. Total volume changes used in conjunction with the volume pulse may help distinguish between arterial and venous components in photo-electric plethysmography (13). Further studies on vascular reactions in terms of active and passive arteriolar and venous components will be cited later.

The third method available for the study of the peripheral circulation is the actual determination

of flow by means of various modifications of the venous occlusion plethysmograph first introduced by Hewlett and van Zwaluwenburg in 1909-1910 (16). The method is based on the fact that if venous outflow is suddenly stopped the initial rate of limb swelling represents the arterial inflow at the moment of occlusion. Details of the method, sources of error and improved apparatus have recently been discussed by several authors (1, 2, 7, 17, 18, 19). This method allows arterial inflow to be expressed in cubic centimeters per minute.

Since the total blood flow to an extremity represents the summation of the flow to the individual tissues i.e. skin, muscle and bone it is necessary to evaluate plethysmographic records in terms of these component tissues. In the fingers there is no muscle and about 50 per cent skin (2). Assuming that the flow to the bone and tendon is negligible practically all of the blood flow to the fingers represents cutaneous flow. Interpretation of the site of vascular reactions in the forearm is somewhat more difficult. According to Grant and Pearson (20) muscle makes up about 85 per cent and skin about 9 per cent of the forearm volume. Abramson and Ferris (2, 21) however report that the forearm is made up of 58.6 per cent muscle and 13.4 per cent skin. It is probably safe to assume that vascular changes in the forearm represent chiefly changes in muscle flow (20, 27). The possibility of simultaneous changes in the skin and muscle circulation which may either reinforce or oppose one another complicates the picture in this region. Moreover it is probably not safe to use the finger skin reactions as an indication of forearm skin reactions since Hertzman (29, 30) has emphasized the selective vascular pattern in different skin areas. Also as pointed out by Abramson (21) the skin of the finger tips contains abundant arteriovenous anastomoses which are not present in the forearm.

Considerable evidence has accumulated to indicate that the circulation of the skin and muscle may be independently regulated. For example Friedlander and associates (22, 23) observed the effects of various procedures which altered the circulation on the temperature of the calf muscles and skin of the leg. The procedures employed to influence the circulation included lumbar paravertebral alcohol injections, spinal anesthesia, the administration of intravenous hypertonic saline solution, physiological saline solution, adrenalin or typhoid vaccine and reflex heat dilatation. It was found that in all cases except those in which hypertonic saline solution was administered changes occurred in the circulation of the skin with

opposite or no changes in the muscle. The increased blood flow in the forearm produced by nicotinic acid is probably due to an increased muscle flow because it can occur without a rise in the forearm skin temperature (2, 24). Similar results are reported after the injection of insulin (2, 25). Epinephrin has been observed to cause a marked vasoconstriction and decreased flow in the fingers and hand (11, 26), whereas it produces an increased flow in the forearm (26). Abramson and associates (27) found that smoking decreased the blood flow to the hand but not to the forearm. Kunkel *et al* (26) found that local heat produced a much greater increase in flow in the hand and foot than in the forearm and calf whereas the reverse was true of exercise. It is probable that these differences represent chiefly differences in the response of muscle and skin, although variations in the reactions of the skin in the two areas may partly contribute to these differences (Abramson, 21).

The fact that the circulation of the muscle and of the skin responds differently to stimuli of various sorts has practical therapeutic as well as physiological interest. As pointed out by Friedlander *et al* (23) one should choose a therapeutic procedure according to whether one desires chiefly an increased skin circulation (as in cutaneous ulcers) or an increased muscle circulation (as in intermittent claudication). Since sympathetic paralysis fails to increase muscle circulation, ganglionectomy in intermittent claudication has no physiological basis (22, 23). Similarly, local heat is a very effective means of increasing the cutaneous circulation but has little effect on muscle circulation, the reverse is true of exercise (26). Intravenous hypertonic saline solution increases the blood flow in both skin and muscle (23).

Burton (1, 14, 15) has studied the cutaneous circulation in the human fingers, recording volume pulse and flow with a modified venous occlusion plethysmograph. He found a very large range in the normal flow values. The minimum value of flow in maintained vasoconstriction was 0.5 cc/min/100 cc of finger volume. This minimal value corresponded to that calculated from the basal oxygen requirements of the skin. In vasodilatation, however, values of over 100 cc/min/100 cc were recorded. This tremendous range, apparently made possible by abundant arteriovenous anastomoses (28), seems to be primarily concerned with temperature regulation rather than variations in metabolic requirements. The maximum and minimum flow values are subject to change on slow adaptation to high or low temperatures.

This investigator has also studied the spontaneous variations in peripheral vascular tone and their adjustments to the requirements of body temperature regulation. Using direct microscopic observation together with the volume pulse as an index of vascular tone he describes two types of spontaneous fluctuations. The first type, seen by microscopic observation, consisted of local isolated constrictions which might be due to intrinsic spontaneous contractions of the smooth muscle of the arteriole. Similar isolated constrictions have apparently been recorded by Hertzman (29, 30). The second type of periodic constrictions appeared to be simultaneous in the digits of all the extremities of the body and was accompanied by cardiac acceleration and a rise in the blood pressure. These coordinated constrictions are thought to be mediated entirely by the sympathetic nervous system. They occur independently of changes in the skin temperature or of external and psychic stimuli. It was found that this second type of vasomotor rhythm underwent striking modifications with changes in environmental temperature (1, 15). As the temperature of the environment increased, the amplitude of the volume pulse increased while the frequency of the periodic constrictions became less and less. These changes correspond to an increase in the average blood flow as measured by the venous occlusion plethysmograph. The average flow is adjusted to the requirements of heat elimination not by the maintenance of any steady vascular tone, but by the modification of an underlying rhythmic fluctuation between constriction and dilatation (1, 15).

That caution must be used in applying results obtained in the fingers and toes to the rest of the cutaneous circulation, has recently been emphasized (1, 8, 21, 29). Hertzman has employed the photo-electric plethysmograph in the investigation of the circulation in various cutaneous areas (8). He places the richness of the arterial supply to the various areas in the following descending order: finger pad, ear lobe, toe pad, palm of hand, skin of forehead and face, dorsum of finger, dorsum of hand, dorsum of foot, forearm, knee, and tibia. He found that there was a seasonal constancy in the volume pulse of the forearm, forehead, nose, and the dorsum of the hand and foot, in contrast to a warm weather dilatation in the finger pad, toe pad, and ear. The finger was found to be much more labile to the cold pressor test than the forehead and ear. There appears to be no necessary correlation between the richness of the arterial supply and the degree of vascular reactivity (8). Spontaneous vasomotor waves

were seen in all areas but were usually most marked in the fingers (29-30). These waves usually consisted of constrictions in the extremities and dilatation in the head skin with variable responses in the ear and nasal septum (30). These waves may or may not synchronize in different areas and may or may not differ in direction and extent. Auditory and psychic stimuli, deep breaths, the cold pressor test and breath holding all yield marked vasoconstrictor effects in the fingers and toes in hand and foot skin and in the nasal septum with variable effects in the head skin. In the forearm active or passive dilatation or no change usually results from constrictor stimuli (30). Inhalation of amyl nitrite usually causes constriction with late dilatation in the digits and marked dilatation in the forehead ear and nose (9). These results support the concept of selective vasomotor patterns in the circulation of the skin. The skin of the head participates only weakly in vasomotor reactions. Its similarity to the known behavior of the cerebral circulation suggests the possibility of using forehead skin plethysmograms as an index of the cerebral blood flow (30). The vascular reaction of the fingers to cold has been studied (31). On cooling a single finger vasoconstriction occurs there and also in the control fingers of both hands. The constriction is usually most marked and most prolonged in the chilled finger. Dilatation begins after from two to eight minutes. It has been found (10) that photo-electric plethysmographic records of the normal human female breast showed a diurnal variation in the breast circulation. Breast record during pregnancy showed the wave form associated with the onset of menstruation. The peripheral vascular responses to the ingestion of food have been studied by Hirst and Abramson (32). A protein meal increased the blood flow in the hand in every case but a carbohydrate meal had no effect. In the forearm and leg a protein meal increased the blood flow if the experiment lasted over two and one half hours. Carbohydrate produced no significant effect.

A number of physiological factors which affect resting blood flow to the extremities have been reviewed (7, 21, 26, 33, 34). Resting blood flow at a bath temperature of 32°C is greatest in the hand, least in the foot and least in the forearm (33). Kunkel *et al.* (26) also found the hand flow to be greatest under similar conditions although there was little difference between the forearm and foot. Reflex vasodilatation by heating another portion of the body produced the greatest increase in flow in the hand, less in the foot and least in the

forearm (33). This agrees with the findings of others (20, 26). With a bath temperature of 45°C (that is equivalent to applying local heat) the increase in flow is considerably greater than that produced by reflex vasodilatation (33). This is confirmed by Wright and Phelps (7) who found that the direct application of heat and sciatic nerve block were most efficacious in promoting the maximal blood flow to the leg whereas reflex heat was about one half as effective. No reflex vasodilatation was observed in subjects with paravertebral block which indicated its dependence on the integrity of the sympathetic nervous system (33). It is agreed that the flow at 45°C is greater in the hand and foot than in the forearm and calf (26, 33, 34). However, whereas one group (26) found a greater percentage increase in flow over the value at 32°C to occur in the hand than in the forearm, Abramson's data (33) apparently show an opposite result. This point has a bearing on the question of the relative effect of local heat on the skin and muscle circulation. Changes in flow due to spontaneous variations in vasomotor tone or to changes in room temperature are largely avoided at a bath temperature of from 43 to 45°C (26, 33, 34).

The differentiation of active and passive arteriolar and venous components in the vascular reactions of the skin and extremities has recently been stressed (2, 13, 21, 35). By correlating flow, limb volume and arterial and venous blood pressures, certain deductions can be made regarding the site of vascular reactions. From such observations, Abramson (21) believes that the diminution in limb volume produced by such stimuli as pinching, mental arithmetic and hyperventilation is the result of both venous and arteriolar constriction in the hand but almost solely of venous constriction in the forearm and suggests that the forearm arterioles are relatively free of constrictor impulses. From a study of the spontaneous volume changes in the hand, Abramson and Katzstein (35) concluded that alterations in the caliber of the venous bed were chiefly responsible and emphasized that changes in volume do not necessarily reflect alterations in arterial inflow. It has been found that the participation of the radial artery in constrictions of the finger arteries was irregular and most obvious in cases of massive circulatory disturbances (36). There is some evidence (37) that the maximal blood flow in the resting limb is determined to some extent by the diameter of the larger supplying arteries.

The effect of tobacco smoking on the peripheral circulation has been studied by several investiga-

tors (27, 38, 39) Smoking produced the greatest vasoconstriction in the fingers (39) and in the hands and feet (27), whereas in the forehead (39) and forearm (27) no effect was produced. Since deep inspiration may cause constriction in the hands and feet with relatively little effect on the forehead skin (39), the question arises as to whether the observed decreases in flow are due to deep breathing rather than to the actual smoking. That deep breathing alone can account for the greater part of the decrease is supported by the fact that puffing on an unlighted cigarette (39), or inhaling smoke from denicotinized cigarettes (38) produced as great vasoconstriction as actual smoking, or more.

The application of photo-electric plethysmography to the study of peripheral vascular disease has been discussed (40). In arteriosclerosis and in thrombo-angitis obliterans, the "maximal" blood flow to the foot may be reduced as much as 50 per cent without the appearance of symptoms or trophic changes (34). When the flow is reduced to 33 per cent of normal, symptoms and trophic changes usually appeared. In both of the above conditions, cases were observed which presented severe intermittent claudication in the presence of a normal foot flow, hence the latter does not rule out an inadequate circulation to the muscles of the calf. An abnormally high blood flow to the finger tip in simple clubbing has been reported (41). In hypertrophic pulmonary osteo-arthritis, the flows were normal, however.

The peripheral blood flow in hyperthyroidism has received considerable attention (41-46). Sheard and Williams (45), and Kirklin, Plummer, and Sheard (44) studied the skin temperature of the extremities in normal subjects and in hyperthyroid subjects before and after medical and surgical therapy. They found that the temperature of the toes was higher with an increasing basal metabolic rate and fell to normal limits when this rate returned to normal. This result is supported by Stewart and Evans (43) who found that the peripheral blood flow (measured by a calorimetric method), the skin temperature, and the basal metabolic rate followed the same trend in hyperthyroid patients before and after therapy. Abramson and Fierst (42, 46) found an increased flow to the forearm and leg but not to the hand in hyperthyroidism. After the administration of Lugol's solution and subtotal thyroidectomy the forearm flow returned to normal in from eleven to sixty-eight days. Normal finger flow in hyperthyroidism has been reported by Mendlowitz (41).

The peripheral blood flow in hypertensive subjects has been reinvestigated. Abramson (47)

compared the forearm flow in 38 normal and 28 hypertensive subjects using a venous-occlusion plethysmograph with the precaution to exclude the venous return from the hand. The error involved in measuring forearm flow if this precaution is not taken was first pointed out by Grant and Pearson (20) and subsequently confirmed by others (26). Abramson found a definite increase in the forearm flow in hypertensive subjects and suggests a re-examination of the statement that increased vascular tone exists at the periphery in hypertension. He explains the disagreement between his results and those of earlier workers (48, 49) as being due to the fact that these investigators did not exclude venous return from the hand. Stead and Kunkel (50), however, found the flow to the foot, hand, and forearm to be essentially the same in normal and hypertensive subjects and believe that the peripheral resistance is uniformly raised. Mendlowitz (41) reports a normal finger flow in hypertension.

LYMPH

A review of the peripheral circulation would be far from complete without consideration of the lymphatic system, particularly that of the skin. An understanding of the structure and behavior of the cutaneous lymphatics is important in appreciating their response to injury and infection of the skin, as well as their role in many other cutaneous and circulatory phenomena. By means of a micro-injection technique and dyes of varying molecular weight (diffusibility), the characteristics of the cutaneous lymphatic capillaries can be directly observed and have been studied in animals and in human subjects (1).

Using the afore-mentioned technique, Hudack and McMaster (1) found that the cutaneous lymphatic capillary is a closed channel from which dyes escape secondarily. (The idea of the lymphatics as closed tubes completely separated from the surrounding tissues by a continuous layer of endothelium was presented by Sabin in 1916 (33).) Hudack and McMaster found that there was an active flow of lymph in the mouse's ear under ordinary conditions and that the movement of dye was always toward the main collecting system. Distal flow of the injected dye was prevented by valves in the lymphatics as well as by fluid flow. The same dyes were found to be retained by both the lymphatic capillaries and the blood capillaries, and the walls of both were permeable to the same dyes. Particulate matter, such as India ink, did not pass through the wall of the lymphatic. The lymphatic capillary appeared to differ from the blood capillary in that the

former did not seem to possess any gradient of permeability such as that ascribed to the latter. It was concluded that the wall of the lymphatic behaves as a semipermeable membrane.

Having observed some of the general properties of the lymphatic capillaries, McMaster and Hudack (2) studied the effect of various factors on its permeability. Obstruction of the lymphatic capillaries of the mouse's ear was found to lead to an increased permeability without dilatation of the vessels. The cutaneous lymphatic capillary was found to be very sensitive to pressure as illustrated by the fact that cutaneous pressure insufficient to injure the epidermis resulted in a prompt increase in lymphatic permeability confined to the area pressed upon. This increase in permeability, though transient (lasting for a few hours) was marked to the extent of allowing the passage of hemoglobin through the lymph capillary wall. Warming the ear to 43 C. exposure to sunlight and slight chemical irritation all increased the lymphatic capillary permeability. This increase in permeability precedes the development of edema. These authors point out that much of the usefulness of the lymphatic capillaries depends upon the state of permeability of its walls and that changes in this permeability must alter the function of the lymphatic system as a channel and must be in part responsible for the local accumulation of fluids.

Adapting their technique to living human skin the authors observed directly the response to intradermally injected dyes (3). They found the cutaneous supply of lymph capillaries to be very abundant. Any scratch of the skin, even though not penetrating the epidermis, gives rise to conditions conducive to lymphatic absorption. So closely meshed are the lymphatics of the skin that even a fine hypodermic needle cannot avoid tearing some of these vessels if introduced into the skin. Hence intracutaneous injections must necessarily be to some extent intralymphatic. Dyes injected intracutaneously frequently tend to spread through the superficial plexus of lymphatic vessels, but in some individuals the injected material may tend to enter the deeper lymphatic at once. The difference in behavior is explained as being due to physical factors determined by skin texture. The influence of skin texture on the rate of spread of intracutaneously injected dye was further illustrated by Levin, Silver and Berkowitz (4) to vary directly with the laxness of the skin. Hence the rate of spread with increasing age. McMaster and Hudack (5) found that lymphatics introduced intracutaneously in the forearm reach the axillary lymphatics in a few minutes even with the arm at

rest. This finding suggests that for certain substances strict localization of an intracutaneous inoculation is a very transient phenomenon. Stroking the human skin with a blunt instrument to produce a wheal causes the lymphatic capillary walls to become permeable to such an extent that they no longer hold back dyes for which they were normally a temporary barrier at least. These authors found that the cutaneous lymphatic capillaries of the human being has a permeability and behavior similar to those of the mouse's ear.

In a subsequent study (4) these authors reported that the behavior of the severed lymphatic capillaries differed greatly from that of the small blood vessel. Unlike the blood vessels the lymphatic capillaries remain open after injury for as long as forty-eight hours, their gaping ends serve as open channels for substances introduced into the wound and provide a reasonable explanation for the fact that infection following skin incisions or injury is predominantly along the lymphatics. All around an injury the lymphatics are at first rendered abnormally permeable as are the blood vessels. At a later time while the blood vessels are still more permeable than normal the lymphatics permit far less dye to escape from the area than usual. The retention of dye at the site of inflammation was also observed by Menkin (6) who found that trypan blue injected directly into the inflamed area fails to reach the regional lymphatic nodes. He explained this finding as due to the occlusion of the lymphatics and to fibrin network in the inflamed area. Drinker, Hiett and White (7) in their study of sterile inflammation found that the rise in lymph pressure in the warmed extremity followed the rise in venous pressure which occurred immediately in a region subjected to sterile inflammation. They suggest that the gelatinous material in the inflamed area rather than the lymphatic occlusion may account for the localization of dye. They further describe how trypan blue fixed in an extremity with sterile inflammation appeared in the lymph from this area after the mere inflation of the dog's tail. Such observations emphasize the importance of immobilization and posture in facilitating the localization of infectious or reducing systemic absorption from an infected area to a minimum (3, 4).

That posture is an important factor in cutaneous lymphatic capillary flow was indicated by further observations of McMaster (1). He found that in the horizontally placed small animal there was only a slight flow of lymph in these capillaries (3). In a normal arm or leg hanging downward lymph flow ceases for a few minutes

of the dependent limb increases (36). It was observed that sufficient elevation of the previously dependent arm or leg caused the lymph flow to become active. Partial obstruction of the veins from without causes lymph flow to cease in the skin of the obstructed arm and when the obstruction is released there is a very active flow of lymph accompanying the active hyperemia which follows release of the venous obstruction. The lymph flow is even greater following release of a total circulatory obstruction, whether or not the limb has been previously engorged with blood. It was further observed that in the limb with a total circulatory obstruction the lymphatic capillaries in the ischemic areas (Bier's spots) are constricted while those in the congested areas are dilated. Both constricted and dilated lymphatic channels show rapid drainage after relief of the obstruction.

Observations on the effect of sucking the skin following the intradermal injection of dye indicated that while this practice may remove part of the foreign material, much of it is driven into the lymphatics draining the site of the injection (7).

A further point of interest in considering the proper posture, support, and dressing for an extremity is suggested by the observation, "Lymph flow was observed to cease in the subcutaneous channels when by means of a cuff about the upper arm an external pressure was applied which was far less than that required to obstruct venous flow."

A study of the lymphatics and lymph flow in human beings with cardiac edema demonstrated that the skin lymphatics in edematous areas were patent, full of fluid, and much widened (8). The escape of dye from the lymphatic channel was more rapid than in the normal skin. A retrograde distribution of the dye with subsequent appearance at a site distal to that of injection was interpreted as evidence of valvular incompetence secondary to dilatation of the lymph channels. Observations on patients with nephritic edema revealed that while the lymph capillaries were wider than normal there was no evidence of valvular incompetence. Instead of the lymphatic stagnation observed in cardiac edema, a lymph flow considerably greater than normal was found, even when edema fluid was accumulating. The cutaneous lymph flow was also greater in the period of fluid equilibrium and was very rapid in periods of diuresis. Watkins and Fulton found that diuresis induced in the dog by mercupurin was accompanied by a reduced flow of lymph from the thoracic duct (37). It would be interesting to know whether or not an increased cutaneous flow of lymph occurred in these animals.

Parsons and McMaster (9) perfused the ears of rabbits with defibrinated blood, using an apparatus which permitted the propagation or withdrawal of a pulse wave at will, but with the same "systolic" pressure in both instances. In the absence of pulsation they found almost no flow of lymph, while in the presence of a pulse wave there was a rapid flow of lymph. Non-pulsatile perfusion resulted in a slight flow of lymph during the development of an edema, while under similar conditions the pulsatile flow of blood resulted in the formation of large quantities of lymph.

The synchronous pulsation of lymphatics and arteries was recorded by Cressman and Blalock who pointed out that the transmitted arterial pulsations in conjunction with competent lymphatic valves probably promote lymph flow in the resting tissue (38). McMaster and Hudack further demonstrated (10) that the pulsation of the blood vessels in the perfused rabbit's ear caused a greater formation and flow of lymph, a greater interstitial spread of dye, and a much more rapid removal of dye from the tissues, than those observed when the circulation was of the same pressure but non-pulsatile in character. The change in vessel caliber caused by the pulse appears to produce its effect by squeezing and weaving the formed elements of the tissues. This impression is in harmony with the facts that the pulse exerts its greatest effect before the formed elements of the tissues are separated by edema fluid, and that active hyperemia preceding edema is accompanied by increased dye spread and by a greater formation and flow of lymph (10).

The spread of dye in the edematous ear was found to be the same whether or not the ear was living, so the authors (11) concluded that the spread was by diffusion. This study of the effect of normal and pathological factors on the spread of dye in the tissues revealed that the spread is greater in the quiet living ear of a normal animal than in one just killed; that it is quite rapid during the early stages of edema formation; that it is greater in normal animals actively moving about; and that it is greatest of all in tissues subjected to gentle intermittent changes in external pressure.

A study of the method of interstitial spread of vital dyes (12) provided further information on the physiological conditions existing in connective tissue. These tissues are nourished by fluid from the blood vessels which may be returned to the circulation directly or indirectly by way of the lymphatics. The question is raised as to whether or not actual tissue spaces do exist and, if so, what is their function. With the use of an ultrapak microscope and a diffusible dye, pontamine sky

blue which does not stain the tissues during the time of the experiment it was possible to observe directly the passage of the dye from the lymphatics into interstitial spaces of the mouse's ear. According to these observations the dye appears outside of the lymph channels as minute wavy lines of color which can be bent and twisted by pressure from a microprobe and will still resume their original position when the pressure is released. The bristly lines of color are thought to be formed by dye moving between or along connective tissue fibers. With the occurrence of the edema which is eventually produced by the presence of the dye the lines of color disappear and the coloration becomes diffuse and freely movable. If edema precedes the introduction of dye into the lymph channel the dye escapes as a freely movable colored cloud rather than as discrete lines of color and the manner of its passage into the tissues is completely changed. It was observed that in dehydrated or dead animals the bristles of color were more evident than in normal ones which emphasized some of the characteristics of the mode of transmission of dye through the tissues. When the amount of tissue fluid was increased by the intravenous injection of large amounts of fluid the colored bristles were seldom seen. Free fluid was not demonstrated in normal tissue and the authors believe that the surfaces of connective tissue fibers serve as pathways for the extravascular transport of large molecules. Observations were carried out on a number of different tissues and always with the same result. It was also suggested that a perisfibrillar movement of substances may be the method by which nutriment is supplied to the tendons and the central nervous system.

With still more diffusible dyes (13) the means of escape from the lymphatic channels into the surrounding tissue was observed to be the same as for pontamine sky blue if the vessel was uninjured. Since differences in chemical characteristics and diffusibility did not alter the mode of interstitial movement the principle involved appears to be a general one. The extension of dye from the lymph channel seems to be conditioned by the form and structure of the connective tissue fiber and this process can be greatly increased and hastened by intermittent external pressure. This concept assigns to the connective tissue fibers an important role in the spread of substances through tissues subjected to pressure changes.

In summarizing these experiments (13) therefore it may be said that they give evidence of the existence of a tissue matrix in the organ but furnish no evidence for the presence of free inter-

stitial fluid in normal tissue. In tissue subjected to chemical irritants or in frankly edematous tissue the presence of free interstitial fluid can be readily demonstrated by this method of study. Under these abnormal conditions the mode of dye extension is completely changed and it appears in the tissues as a colored cloud that is freely movable by pressure. Thus it would appear that if any free fluid exists in the tissues it must be present in very small amounts that the large spaces seen between connective tissue fibers in fixed specimens are probably artifacts and that normally at least part of this space is occupied by an intercellular matrix. The authors point out that this work does not conflict with the concept that from 10 to 30 per cent of the body's water is extracellular and extravascular. This work gives no evidence concerning the amount of extracellular and extravascular fluid but is highly suggestive regarding its state indicating that this fluid is not a freely movable liquid filling interstitial spaces as lacunae. Elsewhere it has been reported (14) that no brownian movement can be observed directly in the tissues another observation which suggests the absence of interstitial fluid. However Maurer has collected a straw-colored fluid from the extracellular extralymphatic spaces of frog muscle (27).

Further work (15) directed toward an understanding of the factors involved in lymph formation indicated that the take up of microscopic amounts of fluid by the cutaneous connective tissue of the mouse is an intermittent process. This is true whether or not the fluid is under pressure and occurs in the presence of intact uninjured blood and lymphatic capillaries. Furthermore it was shown (16) that the spontaneous uptake of fluid by the interstitial connective tissue of the skin is augmented by hyperemia of the tissues but that the uptake is still intermittent. Venous obstruction caused an outflow of fluid from the tissues into the injecting apparatus and when the obstruction was released there was a rapid but intermittent uptake of interstitial fluid during the stage of reflex hyperemia which followed release of the obstruction. Depriving the skin of its circulation results in a cessation of fluid uptake by the tissues at atmospheric pressure but a continuous flow can be caused by a positive fluid pressure. The uptake of edema forming fluids forced into the skin of either living or dead animal is also by a continuous process as is the uptake of serum and sperm oil. These results indicate that the passage of interstitial fluid into the blood vessels and also its escape may both be intermittent processes under normal circumstances.

McCarrell (28), using passive motion to stimulate a uniform flow of cervical lymph, found that very little absorption of fluid from the nasopharynx occurred during its perfusion with Ringer's solution, but that a large increase in cervical lymph flow followed perfusion with distilled water.

A study of the lymphatic pathway from the nose and pharynx by Yoffey and Drinker (17) demonstrated that trypan blue and another dye, T-1824, may be recovered from the cervical lymph from fifteen to thirty minutes after they have been placed in the nose of the cat or monkey, similar results with different time intervals were obtained with the rabbit and dog. The two dyes mentioned were also absorbed directly into the blood from the nose. When a fine suspension of particulate matter (hydrololig) was introduced into the nose instead of a solution of dye, none of it was ever recovered in the cervical lymph. Neither the dye nor the particulate matter, though left in the nose for as long as six hours, was found to pass through the cribriform plate and reach the interior of the cranium. Egg albumin was recovered in cervical lymph after its introduction into the nose of various animals (18), while similar experiments with horse serum gave negative results and those with serum albumin were negative in cats, but positive in a rabbit. Vaccinia virus dropped into the nose of susceptible animals was not recovered from the cervical lymph in less than twelve hours (19), but from twelve hours up to seven days, a stream of virus was found to enter the blood through the cervical lymphatic ducts. The passage of the virus through the regional lymph nodes following intracutaneous inoculation was demonstrated, also, the *in vitro* fixation of the virus by lymphocytes. In another study (20) employing rabbits, it was shown that the regional lymph nodes may serve as a source of the neutralizing principle for vaccinia. The Toomey "1" strain of poliomyelitis could not be detected in cervical or thoracic-duct lymph after intranasal or intracerebral inoculation (21).

The passage of rabbit virulent Type III pneumococci from the nose or trachea into the lymphatics draining the involved area has been shown to occur (22). The lymph collected during a four-hour period was rarely found to be negative and was frequently positive at the end of the first hour. The organisms were found first in the lymphatics and subsequently, in a few instances, were recovered from the blood during the four-hour test period. The intravenous administration of antiserum from two and one-half to three hours before the installation of the organisms decreased the

frequency of recovery of the organism from the lymph or blood as well as the length of time during which the organism could be recovered from the efferent lymphatics. It has also been shown that viable streptococci injected into the paranasal sinuses or into the parapharyngeal lymph nodes may be recovered from the lungs, liver, and spleen (29).

A study by McCarrell (23) of the effect of hyperthermia on the cervical lymph flow of the dog has demonstrated two periods of increased flow when the temperature of the body is elevated by raising the room temperature and interfering with the normal process for body cooling. The first rise in the rate of cervical lymph flow (1 to 4.5 times the control values) occurred at a body temperature of from 38.3 to 41.1°C, and was thought to be due to peripheral hyperemia. Peripheral hyperemia increased the rate of capillary filtration and resulted in an increased amount of lymph, which was shown to have a lower protein content than the lymph collected during the control period. The second rise in lymph flow (3 to 18 times the normal) appeared at a temperature of from 41.9 to 43.5°C, and was brought about by circulatory failure and the anoxemia, venous stasis, and increased venous pressure which occurs in circulatory collapse.

Maurer has shown (24) that exposure to either low oxygen or high carbon-dioxide tension causes an increased production of cervical lymph in the dog. It was found that following the initial exposure to a low oxygen tension, it became increasingly difficult to produce this effect on lymph flow by subsequent exposures. It was also found that an increased production of lymph occurred during rebreathing experiments when the arterial oxygen saturation reached 75 per cent, which is equivalent to an altitude of 17,000 feet, and that the production of lymph was greatest when the arterial saturation reached 52.5 per cent, which is equivalent to an altitude of 20,000 feet.

It was also shown that exposure to low oxygen tension resulted in damage to cardiac blood capillaries, as indicated by a greatly increased flow of cardiac lymph, and subsequent exposure to pure oxygen failed to restore the normal capillary permeability.

While it was found that the concentration of protein in the lymph varied inversely with the rate of lymph flow, yet the total amount of protein contained in the lymph in milligrams per minute increased with the increased flow and decreased as the flow subsided. Coincident with the increased output of lymph proteins a decrease in the concentration of serum protein was observed,

this decrease seems a little surprising to the reviewers inasmuch as the relative loss of fluid from the blood apparently exceeded that of protein.

Acacia injected intravenously appeared regularly in the lymph equilibrium between the serum and lymph acacia occurring after from forty minutes to two hours. The albumin to globulin ratio in the lymph was found to remain constant for all rates of flow. The increased passage of protein and of acacia into the lymph from the blood stream brought about by decreased blood oxygen or increased blood carbon-dioxide tension is believed to be indicative of increased blood capillary permeability with the loss of fluid and protein from the circulating blood.

A technique has been described by Drinker and coworkers (25) for collecting the entire flow of cardiac lymph from the dog. By this technique they have found that the cardiac lymph flow varies directly with the vigor of the heart beat and that it increases with dilution of the plasma proteins as does the lymph flow from other sites in the body (6). They found that cardiac lymph is a filtrate of the blood capillaries that it normally contains albumin and globulin and that it clots also that horse serum and gum acacia injected intravenously can subsequently be demonstrated in cardiac lymph which is indicative of the permeability of the cardiac capillaries.

Anatomical studies of the lymphatic system of the heart have been reviewed and extended by Latek (30). The continuous plexus of the subepicardial lymphatic capillaries of the dog contains numerous valves. Lymph vessels are received from the myocardium and these converge to accompany blood vessels. They eventually form a single trunk which drains the entire heart. Gray using thorotrast as a means of demonstrating the lymphatic channels has studied the relation of the lymph vessel to the spread of cancer (39). He states that the lymphatic capillary has a wall of true endothelium and that a collecting trunk lymphatic vessel consists of endothelium surrounded by smooth muscle and adventitia. He describes the lymphatic valves as two semilunar cusps in exact apposition to one another and says they occur at more frequent intervals than those contained in the veins. Gray concluded that for operable cases of cancer the spread should be considered as entirely embolic.

That lymphatic drainage is essential was indicated by the report of Blalock and his associates (40). They found that complete lymphatic blockage was difficult to achieve in dogs or cats but that an almost total disappearance of eosinophils and lymphocytes from the peripheral cir-

culation resulted from this stoppage when it was achieved. The 3 dogs in which an adequate lymphatic obstruction was obtained soon became moribund. Extravasation of chyle into the tissues and distention of the lymph channels were conspicuous autopsy findings on abdominal organs. No lymphaticovenous communications were demonstrated.

For a comprehensive treatment of existing information on the lymphatic system up to 1933 the reader is referred to a volume on that subject by Drinker and Field (31). More recent material can be found in a review by Warren (32) written in 1940.

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ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

HEAD

Boldrey E. and McNally W. J. Chordoma of the Basal Occiput and Basisphenoid. Report of 4 Cases. *Arch. Otol. & L.* 1941 33 391

Chordoma of the basal occiput and basisphenoid may be confined to the cranium and the cranial cavity or it may erode into the nasopharynx. In the latter event biopsy of tissue obtained with a large needle under vision by means of the nasopharyngoscope is simple, safe and conclusive. Smear preparations of chordoma are quicker to make and more uniform than cut sections and show the true type of tumor better.

Radium and roentgen therapy will produce a definite regression of the tumor in some cases and should be given a trial in the treatment of patients with this disease.

The authors report 4 cases studied at the Montreal Neurological Institute and the Montreal General Hospital. **NOAH D. FAHIC, M.D.**

Kazanjian V. H. Treatment of Benign Tumors of the Jaw. *J. Am. Dent. Ass.* 1941 8 38

Benign tumors of the jaw arise from two sources: the tooth germ tissues during tooth development and epithelial remnants retained in the jaws. They may be either cystic or solid in character. Cystic tumors may be divided into the following groups:

1. Dental root cysts called radicular or paradental cysts.

2. Follicular cysts called dentigerous cysts.

3. Traumatic cysts.

4. Incisive canal cysts.

5. Adamantinomas.

Clinically these cysts have many points in common: they grow slowly and form a definite cavity which is surrounded by healthy bone; they usually do not cause any discomfort especially in the early stages unless the fluid in the cavity becomes infected; they may become large and may weaken the jaw bone and they are benign and therefore destructive effects are only local.

Radiographic examination is the principal means of diagnosis but it may be difficult to differentiate giant cell tumors from adamantinomas and metastatic tumors of the jaw from myelomas by this method.

No single surgical procedure is applicable in the treatment of all types of cases. In general, one of the treatments of odontocystic tumors consists of: (1) exposing the cavity; (2) removing the cystic contents and the membrane; and (3) eliminating the cavity. The elimination of the cavity is the most important factor in the treatment. The various methods used are described in detail.

Adamantinomas are sometimes called multilocular cysts or polycystic ameloblastomas. They are true epithelial tumors and are thought to originate from the epithelial cells of the enamel organs. They are more destructive to the normal bone of the jaws and are therefore locally malignant. If imperfectly treated they may undergo malignant degeneration and invade the neighboring soft tissues.

The treatment is surgical and it is essential to remove more bony tissue than appears to be involved in the x-ray pictures. Often the entire thickness of the jaw is involved and resection of the mandible is accepted as the only method promising a complete cure. Treatment of the deformity resulting from the radical operation for adamantinoma should be uppermost in the surgeon's mind.

Giant cell tumors in the maxilla and mandible are usually benign single tumors which may be divided into two main groups: peripheral giant-cell tumors and central giant cell tumors. The peripheral type usually involves the alveolar processes close to the teeth. It is often confused with epulis, a true fibroma which does not contain giant cells. The central type originates from the cancellous part of the bone. It is often found at the angle of the jaw and at the symphysis.

Giant cell tumors of the jaw are benign. Though they cause destruction of healthy tissue by expansion, they do not metastasize nor extend into the lymphatic tissue. The treatment is complete surgical removal of the mass; this is the method of choice. Since this type of tumor is known to have a tendency to recur, it may be advisable to correct the bony cavity thoroughly after the tumor has been shelled out. This procedure should be followed by radiation therapy or cauterization of the surface of the cavity with an escharotic solution. **S. MURKIN, M.D.**

Bell y H. The Treatment of Tumor of the Parotid Gland with Special Reference to Total Parotidectomy. *Br. J. Surg.* 1941 29 57

It is Bailey's belief that by instituting some radical alterations in teaching and practice, all but a very few parotid tumors can be placed in a category of absolute curability. He advocates six essential modifications of current teaching. These are:

1. Most of the tumors of the parotid gland are to be considered radioresistant.

2. If recurrence is to be kept at the minimum, the capsule of encapsulated tumors must be completely removed.

3. Adequate exposure should be employed.
4. Salvary fistula following operations for parotid tumor occurs rarely; that it should not be regarded as a deterrent to the radical surgery advocated.

5 The surgical anatomy of the parotid gland should be revised. Complete extirpation of the gland with preservation of the facial nerve is a feasible undertaking for which there are definite indications.

6 Even when facial palsy occurs, the deformity can and should be alleviated.

In his discussion of the technique of total parotidectomy, Bailey describes an adequate incision, mobilization of the superficial lobe, division of the isthmus, and removal of the deep lobe.

NOAH D. FABRICANT, M.D.

EYE

McKee, S. H. Malignant Melanoma of the Uveal Tract, An Analysis of 42 Cases. *Arch. Ophthalmol.*, 1941, 25: 238.

Since 1924, 42 cases of sarcoma of the uveal tract have come under observation. The disease is relatively rare. It is one of the most malignant of ocular diseases but it rarely occurs in both eyes. The prognosis as regards life in a large percentage of cases is absolutely unfavorable. Local recurrences in the orbit and general metastasis frequently develop after removal of the eye.

Of the 42 patients whose cases are recorded here, 23 were men and 19 were women. The age incidence was as follows:

Under twenty years	1 patient
From twenty to twenty-nine	3 patients
From thirty to thirty-nine	5 patients
From forty to forty-nine	7 patients
From fifty to fifty-nine	9 patients
Sixty years and over	17 patients

In the great majority of cases, some visual disturbance brought the patient to consultation. In 5, there was a definite history of previous injury to the eye.

In 1931, Callender described 4 or perhaps 5 specific types into which all primary malignant uveal neoplasms may be classified:

- 1 Spindle-cell type
 - a These tumors are usually fairly heavily pigmented
 - b The cell is usually lightly pigmented
- 2 Fascicular type. Pigmentation is usually scanty
- 3 Epithelioid type. This type varies greatly in the degree of pigmentation
- 4 Mixed-cell type. The tumors are very heavily pigmented

Callender and Wilder further classified these tumors by their argyrophil fiber content:

- 1 Tumors having no fibers, or fibers only in the interlobular stroma
- 2 Tumors having areas with and areas without fibers. This group is subdivided into (a) tumors having a definite preponderance of fiberless areas, (b) tumors having areas with and areas without fibers in approximately equal numbers, and (c) tumors having a preponderance of areas containing fibers

3 Tumors having, in all areas, fibers forming a network about individual tumor cells.

In the classification of tumors by fiber content, the malignancy of the tumor appears to be inversely proportional to the degree of intercellular invasion by argyrophil fibers.

The outstanding facts brought forward in a recent article by these authors are that there are no deaths from tumors of the spindle cell (subtype a), or from tumors of Group 3 in the classification according to fiber content, and that in every case in which no argyrophil fibers appeared among the tumor cells, the patient has died.

Freedom from metastasis for the usual five-year period is not a sufficient interval to determine malignancy.

McKee wishes to emphasize that a serous detachment of the retina may be the primary symptom also of metastatic carcinoma of the choroid. In a patient past his fortieth year a spontaneous detachment of the retina in a non-myopic eye should be considered with the greatest suspicion. The mixed-cell tumor appeared to be the most malignant in Callender's first tabulation, but now the epithelial group is placed ahead of the mixed-cell type in malignancy rating.

Unquestionably the follow-up in these cases tends to verify the statement that the spindle-cell (subtype a) tumor is relatively benign.

LESLIE L. MCCOY, M.D.

EAR

Grove, W. E. An Evaluation of the Ménière Syndrome. *Ann. Otol., Rhinol. & Laryngol.*, 1941, 50: 55.

In the Ménière syndrome we have a fairly common condition affecting middle life, and characterized by a triad of symptoms—vertigo, tinnitus, and deafness. It is of unknown etiology and little known pathology. In the etiology, more serious consideration must be given to allergy, avitaminosis, and disturbances in the endocrine balance than has hitherto been accorded to them.

Many prominent investigators maintain that the chief pathological feature of this condition is a water-logging or edema. This condition is probably a metabolic disturbance, but whether it is a disturbance of the water balance or of the metabolism of the sodium ion, or both, is not entirely clear.

The operation of this disturbance in metabolism seems to find its greatest expression in the labyrinth where it initiates the attacks of vertigo, the deafness, and probably also some of the tinnitus. That not all of the tinnitus originates in the end organ is evidenced by the fact that it persists in many cases after total destruction of the labyrinth or a severance of its nerves. May it not be that this same water-logging process is operating both in the end organ and in the central cochlear nuclei?

The success of the dehydration treatment and the sodium-elimination treatment, as well as of the more

recent treatment with histamine when carried out under proper hospital supervision suggests that the patient should be given the opportunity of trying medical treatment before submitting to surgical intervention.

Grove believes that surgical intervention should be reserved for those patients who have not responded to a medical regime for those who for economic or other reasons cannot be kept on a medical regime and for those whose occupations are such as to preclude the possibility of any return of the vertigo because of carelessness in following a medical regime.

Of the surgical measures proposed it would seem that total section of the acoustic nerve is indicated for those whose hearing in the affected ear has fallen below a usable level and that the differential section of the vestibular portion of the nerve is the operation of choice for those with usable hearing. The operations should not prove hazardous in the hands of the competent neurosurgeon.

NO H D FABRICANT M D

Lindsay J R. Chemotherapy in the Treatment of Complications of Acute Middle Ear Suppuration (Petroitis and Meningitis). *Ann Otol Rhinol Laryngol* 1941 50 59

The treatment of otitic complications has undergone two radical changes recently (1) the use of chemotherapy and (2) the use of adequate methods of diagnosis and surgical approach to the deeper structures of the temporal bone.

An analysis of a group of clinical cases is made with the object of determining the causes for failure or success.

The group comprises 10 cases and two types of complications—meningitis and petrositis. Certain conclusions are drawn from a study of these cases.

Diffuse meningitis of otitic origin has recently been cured by the use of chemotherapy without surgery and in several of the cases reported here the same favorable result might possibly have been obtained without operation.

It is well demonstrated that in the presence of an abscess inside the dura or a focus of necrosis in the temporal bone either large or moderate in size and in the presence of an extradural abscess the use of chemotherapy alone fails to sterilize the focus. Concentrations of 14 mgm per cent and more have been maintained for from several days to two weeks without success. Symptoms have usually been relieved but have reappeared sometimes before though usually after withdrawal of the drug.

Of 10 cases reported 6 were of this type with large foci of suppuration in which surgical drainage was essential. It appears that chemotherapy alone is most likely to be successful in cases in which a complication has developed rapidly by extension along a vascular channel before there has been gross destruction of bone in cases with bone presenting pneumatization of the limited small-cell type or the presence of partial sclerosis.

Chemotherapy would appear to relieve the urgency of surgery but in those cases in which clinical evidence points to suppuration in the mastoid or petrous tip surgical intervention is advisable.

The masking of symptoms can be interpreted as a desirable effect as it indicates a definite limitation of the infective process.

Clinical observation appears to indicate that the effect of drug therapy depends greatly on the extent of pneumatization. Suppurative extensively pneumatized bones tend to resist chemotherapy even in the early stages.

Recurrence or exacerbation of the meningitis occurred in 3 cases after the blood concentration had been allowed to decrease to 6 or 7 mgm per cent. Best results were obtained by creating an initial blood level of 15 mgm and maintaining it for from five to seven days. No serious toxic effects were observed in any of the cases treated but the author believes that the patient should be under constant observation.

JOHN F DELPH M D

MOUTH

Lehmann J. Carcinoma of the Lips and Tongue with Special Consideration of the Cases Treated at the University Surgical Clinic in the City of Freiburg During the Years from 1928 to 1938. (*Ueb. Lipp u. d. Zung. c. c. m. nte b. nd r. B. ru. k. btugu. g. d. J. h. e. 1928 b. s. 1938 in d. Chirurg. h. U. str. t. k. h. k. d. Stadt Freiburg b. h. d. lte. I. II. Fr. b. g. D. s. s. r. t. a. n. 94*)

During the years from 1928 to 1938 39 patients with carcinoma of the lip were treated at the Freiburg University Surgical Clinic. The practically generally known fact that the upper lip is only rarely affected could be confirmed as there were only 3 cases. The proportion of men to women affected amounted to 92 and 8 per cent respectively; the average age was 58½ years; two years the proportion of smokers was 81.2 per cent and that of pipe smokers 31.2 per cent.

After a general discussion of the disease picture the etiology and the prognosis which is considered as relatively favorable the treatment was discussed.

It consists chiefly of the radical operation of the tumor with extirpation of the regional lymph nodes when the palpability arouses the suspicion of metastasis. In 84.8 per cent of the cases freedom from symptoms from one to ten years was achieved; 54.5 per cent freedom from symptoms for at least five years could be achieved.

During this same period of time 15 cases of carcinoma of the tongue were also treated; the clinical aspects of these cases and their pathogenesis were also discussed. In contrast to the prognosis of carcinoma of the lip that of carcinoma of the tongue is extremely unfavorable. The proportion of men to women in these cases was 87 and 13 per cent respectively; the average age was 55½ years; 42 out of 100 cases were situated mostly at the lateral borders of the tongue.

Whereas the cases of tumor of the tongue with a fatal prognosis from the outset were subjected to roentgen irradiation alone, the other cases were subjected to radical surgical removal of the tumor with extirpation of the palpable regional lymph nodes at the same time. Prophylactic roentgen irradiation was carried out in the presence of positive histological finding. In 30.5 per cent of the cases treated freedom from symptoms was achieved for from two and five-tenths to nine years and in 23 per cent for at least five years.

In regard to the etiology of carcinoma of the lip, it is assumed that smoking might contribute to its development. Among the 30 cases discussed, 26 patients were found to be smokers or chewers of tobacco, and of these only 10 were pipe smokers and 7 were both cigar and pipe smokers. Occupationally, they were mostly farmers, drivers, and wood workers, namely, individuals with occupations more or less subjected to weather conditions. Just as in other carcinomas, mechanical, thermic, and chemical factors seem to play a role in the development of carcinoma of the tongue. Further details of the pathogenesis are not yet known.

(HAAGEN) LOUIS NEUWEIT, M.D.

NECK

Lahey, F. H., and Nelson, H. F. Branchial Cysts and Sinuses. *Ann Surg*, 1941, 113: 508.

The generally recognized theory as to the cause of branchial cysts and sinuses is that based on Wenglowski's work, as interpreted by Meyer. Meyer believes that the branchia belong to the head and not to the neck, and that any congenital pathological condition referable to them in human beings must rest along

the mandible adjacent to the hyoid bone and the cornu of the hyoid bone. Nothing, in his opinion, below the lower level of the hyoid bone has any genetic relation to the branchia and all congenital anomalies caused by incomplete retrogression of the branchia must be located in the region around or above the lower border of the hyoid bone. Any congenital anomaly below this level is in definite relationship with the pharyngo-thymic duct and must be classified as a lateral cyst or fistula from this duct.

Bailey believes that he disproves Wenglowski's theory that the branchia never leave remnants in the neck below the level of the hyoid bone by citing a case of a persistent branchial cartilage found in the lower third of a child's neck, a position where a branchial fistula commonly opens.

Many other theories as to the origin of this condition are presented in the literature, and it must be assumed that the cause of branchial cysts and sinuses is as yet not settled. This condition is usually found in the younger age-groups and predominates in females.

Branchial fistulas are generally classified into three types: (1) complete fistulas, having both an internal and an external opening; (2) incomplete fistulas, having either an internal opening alone and classified as incomplete internal fistulas, and (3) fistulas with an external opening alone and classified as incomplete external fistulas.

The usual symptoms that are attributed to branchial cysts and sinuses are a tumor of the neck, a sinus with an intermittent or continuous discharge of secretion, and recurrent attacks of inflammation. Occasionally, an unexplained cough may be due to a tract which adheres to the vagus nerve.

Many conditions which commonly occur in the neck must be considered in the differential diagnosis. Among these are the following: (1) dermoid cysts, (2) cystic hygromas, (3) lipomas, (4) thyroglossal cysts and sinuses, (5) tuberculous adenitis and sinuses, (6) venous hemangiomas, (7) deep cervical

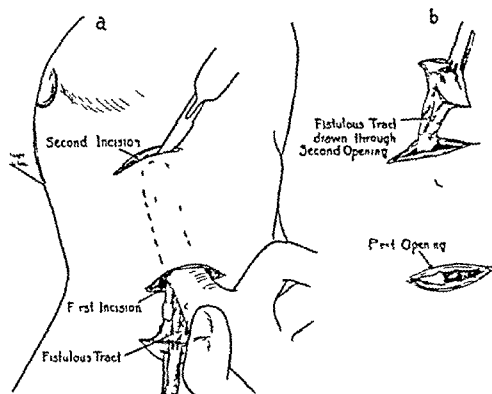


Fig. 1. The step-ladder method of surgical excision of branchiogenic cysts and sinuses. A transverse elliptical incision is first made around the external opening, and the sinus tract dissected upward along the sternomastoid muscles. Care must be taken of the great vessels. A second transverse incision is then made at a higher level in the neck parallel with the first, and the dissected branchial fistula is then brought out through this second incision.

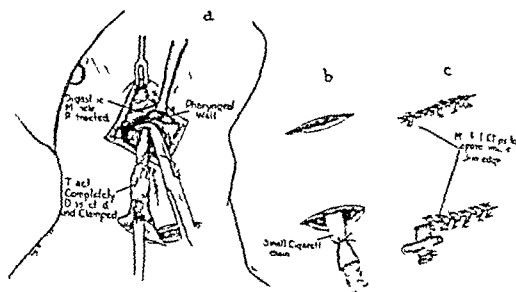


Fig. 2. The dissection is then carried posteriorly to the wall of the pharynx where the tract is sectioned. The authors do not believe that inversion of the fistulous tract into the pharynx is necessary. The hypoglossal nerve is commonly seen in this part of the dissection and must be avoided. The wounds are closed about a small rubber-dam drain. (Courtesy of J. B. Lippincott Co.)

ab ce se (8) actinomycosis (9) Hodgkin's disease (10) lymphosarcoma (11) lymphatic leucemia (12) carotid body tumors and (13) various cervical metastatic neoplasms

A diagnosis of branchial cyst or sinus can therefore be established ordinarily by remembering that it will be found in the neck anterior to the sternomastoid muscles from the angle of the jaw to just above the clavicles. It is of a congenital nature and does not present any peculiar condition mentioned.

The treatment of branchial fistula by the injection of sclerosing solutions is not recommended because of the danger of perforation of the pharynx by necrosis and the marked inflammatory reaction which may result.

A majority of surgeons advocate complete excision of the sinus tract or cyst and suggest various methods. Beck has advocated the use of a collar incision for this procedure such as is employed in operations on the thyroid. Von Hoeker suggests the insertion of a probe into the tract with fixation of the tract to the probe by a ligature which he believes facilitates removal. Baumgartner emphasizes the importance of inverting the stump of the fistula into the cavity of the pharynx whenever possible. Gaston reporting a series of 39 cases from the Cleveland Clinic does not believe that the inversion of the stump of the fistula into the cavity of the pharynx is necessary although he agrees that complete surgical extirpation of the tract is essential.

Bailey uses the so-called step-ladder method of surgical excision and this operation has been utilized in the majority of the author's cases (Fig. 1 and 2). A transverse incision is first made about the external orifice. The skin is freed up gently traction is then exerted on the fistulous tract and the dissection carried up around the tract as far as possible. At this point a second transverse incision is made parallel with the first at a higher level and the tract is brought up from the first incision out through the second higher incision. This allows an adequate exposure during the dissection of the tract up to the wall of the pharynx which is essential.

At times it may be of assistance to place one finger inside of the mouth and apply pressure against the pharyngeal wall so that danger of perforation of the pharyngeal wall can be minimized. The authors do not think that inversion of the fistula into the pharynx is necessary and have never done it.

At the Lahey Clinic follow-up studies have been made in 27 cases occurring during the last ten years. In all cases complete surgical excision was performed. Recurrence has not taken place in any of the cases. SAVVELL H. K. R. M.D.

Fajal F. P. Thyroid Parathyroiditis with Descending Abscess of the Neck and Mediastinitis (Feeder's disease) Abscess of the cells of the thyroid gland. Review of the literature. *J. Surg. Gynecol. Obstet.* 94: 64

Farjat states that inflammation of the perichondrium of the laryngeal cartilages generally re-

sults in the formation of a pus collection between the membrane and the cartilage with subsequent necrosis of the latter because of lack of nutrition. This necrosis may be localized or diffuse. Perichondritis rarely causes hyperplastic thickening of the perichondrium. The process may be primary or secondary. The primary process occurs as a sole manifestation in the larynx; the lesion appears directly in the perichondrium and may spread from there as a pathologic form and a metastatic form are accepted, the latter being the most common and results from a process which is or has been present in the organism (smallpox, grippe, pneumonia, puerperal infection). The secondary process is due to propagation by continuity of a generally ulcerous process of the larynx itself or of its vicinity (tuberculosis, syphilis, tumor, typhoid, smallpox, scarlet fever). It may be caused by trauma or by continuous pressure of a cannula.

The picture will differ with the cartilage involved. Necrosis of the cartilage occurs more easily in hyaline than in elastic cartilage because the latter contains intracellular gland which insure its nutrition as in the epiglottis. While the abscess forms, the perichondrium offers marked resistance to perforation but usually gives way somewhat and a pus pocket appears. In view of the various more or less resistant layers of tissue which cover the larynx it is evident that the possibilities of spontaneous opening of the abscess toward the outside are remote. In addition the habit of waiting for fluctuation before opening the abscess is another unfavorable factor and therefore comes a time when the pus follows the route of least resistance and works its way down toward the mediastinum. The other dangers of prolonged waiting are asphyxia, ulceration of the large vessel and thrombophlebitis of the internal jugular vein.

The author reports 2 cases of perichondritis of the thyroid cartilage in which the abscess reached into the mediastinum. The first case occurred after grippe and required two interventions with an interval of fifteen days; the second case occurred in connection with an attack of pneumonia.

RACH D. KEMEL M.D.

Kaplan F. The Treatment of Postoperative Reactions of Patient with Basedow Disease (Zellweger's disease) Report. *R. K. N. D. B. Sed. Wk. J.* 1940: 147

Up to the present time the best prophylactic remedy for the dreaded postoperative reaction of the patient operated upon for Basedow's disease is the Plummer procedure. But this is applicable only in true cases of fully developed Basedow's disease and must be avoided in all other thyrotoxic cases. Even though only 51% of the patients with Basedow's disease do not respond to the Lugol solution, the most severe reaction is almost eliminated even when a formalin effect produced by the remedy. The author reports 87 operations for exophthalmic goiter among 434 strumectomies per-

SURGERY OF THE HEAD AND NECK

formed during the period from 1937 to 1939. Among these there were a number of Lugol-refractory and Lugol-hypersensitive patients, who nevertheless had to be operated upon. In some of these cases blood letting with subsequent sodium-chloride infusions proved valuable. Furthermore, in 14 cases, of which 3 are described in detail, with a severe postoperative state calcium was administered intravenously in the form of afenil and calcium-Sandoz and Kalzan was given intramuscularly, as a result of which the markedly accelerated pulse and the increased body heat were soon reduced. The effect appears as a dampening of the sympathetic hyperexcitability, which may well be a significant partial cause of the danger of the postoperative Basedow's disease. It is certain that in Basedow's disease, even though the blood calcium level be practically normal, there is an increased excretion of calcium, on the one hand in the intestine for the fixation there of the massively excreted soaps with diarrheas, and on the other hand because of the latent osteodystrophia fibrosa demonstrated in this condition, and this must naturally express itself in an increased excitability of the sympathetic nervous system, when as a result of the resection of the thyroid gland the calcium metabolism sinks still more markedly for several days. In these cases the forced administration of calcium, which is intended not as a substitute for the Plummer procedure but only as a substitute for the latter's failure, can have its most advantageous effect.

(MAX BUDDE) LOUIS NEUWELT, M D

Rasmussen, H. Influence of the Thyroid Hormone on the Heart and Circulation. *Acta med Scand*, 1941, Supp 115

Treatment with thyroid hormone was carried out in 12 dogs in experiments lasting from 28 to 272 days, the object being to bring about death of the animal by this treatment. Parke Davis desiccated thyroid was used. The dose, by weight, in individual dogs varied considerably, as it ranged from $\frac{3}{4}$ gm per kilo to $1\frac{1}{2}$ gm per kilo. This proportion resulted in a daily dose of from 80 to 225 gr of thyroid a day. The individual animals survived 28, 36, 46, 51, 63, 68, 72, 83, 94, 95, 116, and 157 days. The survival time is tabulated with the grams per kilo of the daily dose:

28 days
36 days
40 days
51 days
63 days
68 days
72 days
83 days
94 days
95 days
116 days
157 days

0.88 grams per kilo
1.00 grams per kilo
1.10 grams per kilo
1.08 grams per kilo
0.76 grams per kilo
0.83 grams per kilo
1.47 grams per kilo
0.86 grams per kilo
0.80 grams per kilo
0.78 grams per kilo
0.76 grams per kilo
0.84 grams per kilo

These figures show that the resistance to this intoxication was not correlated with the dosage. The dog which lived longest lived five times as long as

the one which died soonest, and yet this long survivor received a smaller dose. Nor was the survival dependent upon the age or the original weight of the animal. There is no correlation between the length of survival and the elevation of the metabolic rate in fact the animal that lived longest sustained the highest rate and, as might be expected, lost the greatest percentage of its body weight. One gains the impression that the animals that succumbed most rapidly developed an excessive tachycardia in proportion to the elevation of the metabolism.

The authors summarize their findings as follows: "Long-continued treatment with thyroid hormone partly through feeding with desiccated thyroid substance, partly through intravenous injection of thyroxine, was carried out on dogs in order to obtain as complete a picture as possible of the changes produced by the hormone in heart and circulation, as well as to investigate whether these cardiovascular changes are due to increased oxygen transport and, lastly, to study the possibility of bringing about functional or organic disorders of the heart or circulation by means of the treatment."

Their principal findings are:
"1. During constant and vigorous hormonal action with, for instance, 100 per cent increase in oxygen consumption, the heart may be found to vary greatly, from subnormal or normal to extreme rapidity, these variations being observed in one and the same animal. The most characteristic effect of the hormonal influence is not a tachycardia of constant intensity but the paroxysmal rises in heart rate, up to 250 or 300 beats per minute with regular action and retained sinus rhythm."

"2. The systolic blood pressure is augmented and shows a tendency to progressive rise throughout the period of treatment. The diastolic pressure seems to be practically unaltered."

"3. The regulation of the increased heat production is effected mainly by a simultaneous increase of body and skin temperature. A mechanism of heat regulation by help of increased blood flow to the peripheral skin organ does not seem to come into play to any considerable extent."

"4. The arteriovenous oxygen difference is unaltered and the cardiac output increases proportionally with the oxygen consumption. The stroke volume of the heart may be considerably augmented during slow cardiac action, while in violent paroxysms of tachycardia it is considerably reduced."

"5. The electrocardiogram exhibits characteristic but often transient changes, the T-waves in one or most often in all three leads assuming a characteristic appearance with deep negativities. In a later stage the T-waves acquire a peculiar "two-humped" appearance. Increase in duration of the QT interval is a fairly constant phenomenon. No satisfactory explanation can be given of the thyroid electrocardiogram."

"6. The hormone-treated dogs die in a typical state of circulatory insufficiency, which is always inaugurated by and accompanied by attacks of

tachycardia The terminal circulatory failure; thus primarily characterized by intense tachycardia and further by first normal afterwards decreasing systolic and diastolic blood pressure diminishing cardiac output materially augmented arteriovenous difference and a considerable reduction of the stroke volume

Their principal conclusions are

1 The essential feature in the action of the thyroid hormone on the heart rate during rest is not increase of but variability of heart rate. The power of evoking paroxysms of sinus tachycardia is a peculiar and characteristic property of the thyroid hormone

2 The hormonal tachycardia is not due to the extra work imposed upon the circulatory system owing to the increase in oxygen consumption occasioned by the hormone

3 The tachycardia crises when particularly intense and protracted give rise to circulatory failure which finally leads to the death of the animal

4 Thus the thyroid hormone evokes a functional heart disease of which the essential feature is paroxysms of tachycardia and which brings about a fatal cardiac failure

5 The principal deleterious effect of the thyroid hormone on the heart and circulation is not the creation of extra work for the heart owing to increased oxygen transport but the influence it exerts on the cardiac rhythm

6 Far from being a mechanism of circulatory adjustment the tachycardia evoked by the thyroid hormone is a factor detrimental to the heart and the circulatory system

P. L. STARR, M.D.

Kelly J. D. Surgical Treatment of Bilateral Paralysis of the Abductor Muscles *J. A. Otol. & L. Otol.* 1941 33 293

Kelly attempts to answer the question: What can I do to relieve the patient suffering with bilateral paralysis of the abductor muscles and what results can I expect? It is his belief that not all patients with bilateral paralysis of the abductor muscles need immediate operation. A patient (whatsoever the cause of his paralysis) with the cord in the cadaveric position with a good voice and with no dyspnea on ordinary exertion may be watched until he seeks relief. Such a patient whether he is in confinement or in circumstances requiring cessation of physical strain should be tracheotomized and operated upon for paralysis of the abductor muscles at his convenience and that of the physician. From his study and experience the author believes it is wise to wait from six months to one year before operating unless it is definitely known that the nerves have been cut because there have been reports of restoration of function after a lapse of eighteen months.

The author believes that the surgical data gathered through his extensive questionnaire prove without doubt that the greatest success in the treatment of bilateral paralysis of the abductor muscles is attained by those operations in which the arytenoid cartilage is attached either extralaryngeally or intra-

laryngeally. In view of the number of successful operations reported by King it seems imperative that the King operation should be tried before any other extralaryngeal procedure. Arytenoidectomy either through the King incision or through the wing of the thyroid cartilage should be tried on one or both sides before resort to an intralaryngeal operation. If the extralaryngeal operations on the arytenoid cartilages fail, intralaryngeal surgical procedure is in order. Resection of the thyroarytenoid and the cricoarytenoid lateral muscles according to the method of Lore or Rawlins is preferred.

If the laryngologist follows this sequence in the surgical treatment of bilateral paralysis of the abductor muscles he will make no uncertain moves; he will never do more than is necessary to give the patient a satisfactory result and he will most thoroughly conserve the interest of the patient.

NOAH D. FARBER, M.D.

Jackson C. L. Laryngeal fissure for Cancer of the Larynx: Observation Based on a Series of 50 Consecutive Cases *Br. J. Otol. & L. Otol.* 1941 33 530

The author bases this article on 50 cases of carcinoma of the larynx which were treated by the operation of laryngofissure. All patients were operated upon under local anesthesia with 1 per cent procaine hydrochloride injected subcutaneously. The results obtained are as follows:

There was no operative mortality but 6 patients died later of causes other than cancer; 3 of them having survived for three years, 1 for 10 years and 2 for a little over one year. In only 5 patients in the series have recurrences developed and on 3 of these laryngectomy was subsequently done. 1 died of complications following the laryngectomy and the 2 others are still well eight years and eight months after laryngectomy. Ten years and one and a half years respectively after the original operation. One has just had a second laryngofissure and may be given postoperative radiation. Subtracting the last 4 patients who were operated upon less than a year ago and were all free of any sign of recurrence but who were operated upon too recently to count, there remain a series of 46 patients in only 4 of whom recurrences have developed. Therefore 91 per cent of the patients were well and free of recurrence for period of one year and longer. The patients who have been well for eight years and eight months respectively after laryngectomy or being counted as cured. Ten patients have survived cancer-free for five years and more; 3 for 10 years, 13 for three years, 5 for two years and 11 for between one and two years. Since it is generally agreed that little significance can be attached to duration of record of cures of less than three years, that one may add the first three groups together. This gives 26 of 30 patients treated by laryngofissure more than three years ago who are living and free of recurrence for at least three years; an incidence of cures of 86.6 per cent.

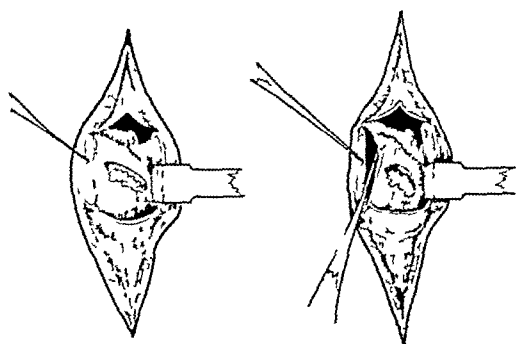


Fig 1 Schematic representation of laryngofissure by the clipping technique. Note the elevation of the internal perichondrium from the inner surface of the thyroid ala (Jackson and Jackson)

Hemorrhage, if it occurs, generally occurs within the first twelve hours. It was observed in only 2 of the cases in this series.

Granulomas form in about 35 per cent of the cases. Sometimes they shrink and disappear in a few weeks. They should be given a chance to do that, and if they do not disappear they should be removed by direct laryngoscopy, for their presence, even though not obstructive to an important degree, will interfere with the development of the voice.

Abscess, perichondritis, and chondral necrosis occur in certain cases and require free drainage.

Bronchopneumonia occurred in only 1 case of the series.

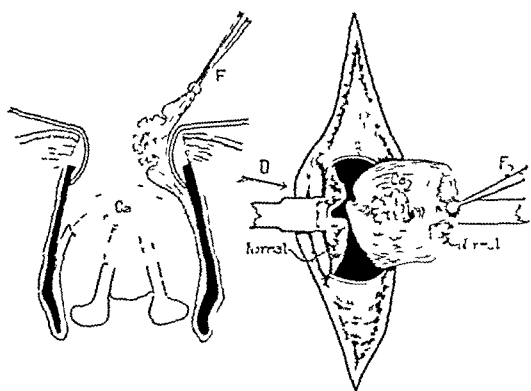


Fig 2 Schematic representation of laryngofissure by the anterior commissure technique. Note that soft tissues are cut first on the less involved side and that the flap is then reflected in such a way as to permit inspection of the lesion before the excision is completed (Jackson and Jackson)

Cure of the cancer is, of course, the primary consideration, but next comes the question of voice. All the patients in the series reported were able to talk, but the quality of voice and its carrying power varied greatly. In some patients the postoperative voice was produced at the cordal level by a remaining good cord approximating with a cicatricial cord or by two cicatricial cords. In other cases it was produced by approximation and vibration of the ventricular bands.

JOHN F. DELPH, M.D.

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS CRANIAL NERVES

McIntyre A. K. *The Physiology of the Cerebellum*
W. J. L. 1941 67

Three methods have been employed in the investigation of cerebellar function, namely ablation, experiments, stimulation, experiments and action current studies. Since the boundaries of the various portions of the cerebellum do not have definite anatomical landmarks, it is best to consider this organ from a functional point of view and use the phylogenetic classification of neocerebellum and paleocerebellum.

So far as the function of the paleocerebellum are concerned, the vestibular portion, consisting of the flocculonodular lobe, the uvula and the lingula and the associated portions of the fastigial nuclei, with their medullary projections, are actually extra-medullary extensions of the vestibular nuclei, and they mediate similar functions. They are necessary for the coordination of labyrinthine impulses with muscular movement in the intact animal, but they play no part in the primitive labyrinthine reflexes of the decerebrate animal. The remainder of the paleocerebellum is mostly concerned with the restraint of excessive activity of the postural reflexes. It produces appropriate changes in the postural pattern according to the requirements of muscular movement when such is signalled by the spino-cerebellar and bulbo-cerebellar tracts. In addition, it seems that the pyramids may be concerned with the ability to judge distances by integrating proprioceptive impulses from the eye muscles.

The neocerebellum, not of importance in the lower mammals, is essential in primates for the maintenance of muscle tone and the proper execution of skilled muscle movement. The dentate nucleus can exert enough control over voluntary movements to prevent the development of tremor and to hasten the process of recovery from cortical ablation. Disturbances of equilibrium and posture, except those due to hypotonia, are not produced by neocerebellar injury. There is apparently no discrete representation of the skeletal musculature in the cerebellum.

JOHN MARTIN M.D.

Denny B. Owen D. *Delayed Collapse after Head Injury* *Cas. Reco. d. Lancet* 1941 4 37

Among many other casualties of the pre-1914 European war, the author has observed a number of patients who, after suffering what would seem to be a minor head injury, showed signs of a delayed collapse, from several hours to a few days following the accident.

The cardinal signs of such a sudden collapse, usually with unconsciousness, are not those which accompany middle meningeal hemorrhage after the

characteristic lucid interval. A common and characteristic disturbance which fails to develop into anything more than a transient complaint is a marked bradycardia, sometimes as low as 38 or 39, with weakness, vertigo and a dull mental state. This condition is not to be classed simply as cerebellar, for it does not prevent all the signs of so-called concussion; it clears up completely and fairly rapidly on rest and quiet, and above all, it is not related to an increase of intracranial pressure.

The medulla appears to be the only region where injury is likely to produce such persistent slowness of the pulse, bloody cerebrospinal fluid, and no sign of greatly increased intracranial pressure. Bruising of the medulla has actually been demonstrated in such cases, and when the injury is not severe enough to cause respiratory or other paralysis, the patient will suffer mainly from weakness and bradycardia. Hemorrhages, being of pinpoint size in the pons, the surface or in the floor or roof of the fourth ventricle. Even a few such hemorrhages, if carefully placed, could account for all the disturbances and vasomotor instability.

Six interesting and illustrative case histories are reviewed.
JOHN MARTIN M.D.

Russell D. S. and Falner M. A. *Antiepileptic in Brain Wound: An Experimental Study of the Histological Reaction of Cerebral Tissue to Various Antiepileptic Solutions* *Br. J. Surg.* 1941 28 47

Cerebral traumatic wound have a strong tendency to become easily infected and they are thoroughly cleansed at surgery only with great risk of either causing great brain damage or even after meticulous attention leaving some remaining nidus of infection. Antiseptics are not commonly used in the brain because of the delicate nature of cerebral tissue. The authors have undertaken the task of determining which if any surgical antiseptic the germicidal potency of which is good upon can be applied to the brain in such a way as to harm the tissue less than would the bacteria.

They point out that in the brain as in the other tissues of the body, the topical application of antiseptics in old established foci of infection is very ineffective compared to the results of such application in fresh wounds because of the location of the bacteria.

The ideal antiseptic for recent or potential infection of the brain should possess the properties (1) it should be a potent bactericidal agent in vivo as well as in vitro (2) it should be innocuous to the tissues locally and (3) it should be harmless to the organism as a whole after absorption.

In their experimental studies the brains of adult rabbits were used with proper controls. The material used and the results obtained are shown.

SUMMARY OF EXPERIMENTS

TABLE I—CONTROLS

Solution	pH	No. of experiments	Degree of reaction in brain
Isotonic buffered saline	7.4	5	Very slight
Isotonic saline	7.0	4	Very slight
Isotonic saline	2.2	2	Slight
Isotonic saline	10.0	3	Slight
Distilled water	7.0	7	Considerable

TABLE II—ANTISEPTICS TESTED

Antiseptic	Solution	pH	No. of experiments	Degree of reaction in brain
1 Acridine compounds Acriflavine	0.1% in distilled water	2.0	9	Severe
	0.1% in isotonic saline	2.0	2	Severe
	0.1% in buffered isotonic saline	7.2	2	Severe
	0.1% in buffered isotonic saline	7.2	3	Severe
	0.05% in buffered isotonic saline	7.4	2	Severe
	0.1% in buffered isotonic saline	6.2	8	Very slight
2 Coal-tar derivatives Dettol	0.1% in buffered isotonic saline	6.2	2	Slight
	5.0% in distilled water	12.0	5	Severe
	5.0% in buffered isotonic saline	7.4	3	Moderate
	"Modified" dettol	8.4	2	Moderate
	5.0% in isotonic saline	8.1	2	Moderate
	5.0% in buffered isotonic saline	8.2	2	Moderate
3 Halogen compounds Azochloramud	5.0% in buffered isotonic saline	8.2	2	Moderate
	0.03% in buffered isotonic saline	7.4	15	Variable
	0.2% in triacetin	4.0	3	Severe
	Eusol	9.0	4	Severe
4 Organic mercurial compounds Metaphen	0.1% in buffered isotonic saline	10.0	2	Considerable
	0.04% in buffered isotonic saline	10.0	2	Considerable
	Merthiolate	10.0	2	Considerable
	0.04% in buffered isotonic saline	10.0	2	Moderate
	Phenyl mercury nitrate	10.0	2	Considerable
	0.04% in isotonic saline	10.0	2	Moderate
5 Hydrogen peroxide	3.0% in distilled water	4.0	2	Moderate
	3.0% in buffered isotonic saline	7.4	3	Moderate
6 Soluseptasine	3.3% in isotonic saline	10.0	2	Slight
	3.3% in buffered isotonic saline	7.4	2	Slight

the accompanying chart, taken from the article. Interestingly enough, hydrogen peroxide, used in many clinics in America for the control of hemorrhage and the surgical toilet of wounds, was found to be rather extensively damaging to the tissues encountered by it. Also variations in the pH of a solution, from as much as 2 up to 10, caused surprisingly little additional damage, and osmotic imbalance, as gross hypotonicity, caused a much more extensive necrosis and hemorrhagic breakdown in the brain than erratic pH levels. Therefore, isotonic solutions buffered as far as possible to the neutral point are ideal for brain use. Proflavine sulfate in 0.1 per cent isotonic solution buffered to a pH of

6.2 is probably the antiseptic to be preferred in the prophylactic treatment of brain wounds, 2.7-diamino acridine hydrochloride is similar in its action to proflavine. There is reason to believe that some of the soluble sulfanilamide compounds, effective locally elsewhere in the body, may be used with safety and usefulness in the brain.

JOHN MARTIN, M.D.

Latham, O. Some Notes on the Pathology of the Cerebellar System. *Med J Australia*, 1941, 1: 164.

Cerebellar pathology is admittedly difficult and elusive of good classification. The author roughly classifies cerebellar disease into 5 groups.

and, therefore, it is difficult to distinguish them. Recurrence cannot be prevented. Gliosarcoma, recently designated as glioblastoma multiforme, is wholly malignant. Prognosis is poor also in medulloblastoma, although a few cases have been reported in which the patients have survived for years. The spongioblastomas, which are in themselves benign tumors, may be located in the chiasma or third ventricle where they are inaccessible. The author contradicts himself somewhat, however, in stating that these tumors behave like protoplasmatic astrocytomas. In considering the oligodendroglioma one has to reckon with two types, one with a tendency toward calcification, and which is readily removed with good end results, and another type characterized by the formation of mucus and a tendency toward infiltrative growth. The tumors of the ganglion cell series are benign, slowly growing tumors, but they are located in the brain stem, medulla oblongata, and cornua of Ammon, and therefore are frequently inaccessible.

Tumors of the pineal gland (pinealomas) are not encapsulated but are usually infiltrative. They are most difficult to remove. Angiomas have frequently been removed successfully. Indications for operation are determined by arteriography demonstrating the type and site of the blood supply. The Lindau tumors, which are located exclusively in the cerebellum also belong to this group. Radical removal offers a very good prognosis. The diagnosis and removal of abscesses are difficult. The results of surgical treatment are markedly dependent upon the pre-operative diagnosis.

The author discusses briefly the advantages of arteriography. Roentgen irradiation has given no positive results, only transitory results in medulloblastoma. The only means of helping the patient is by surgical intervention. According to the results obtained in the First Surgical University-Clinic of Vienna, a three-year survival may be expected in from 43 to 45 per cent of cases. Most of the recurrences take place within the first three years. Excellent tables permit a survey of this fine collective review.

(VOGELEP) EDITH SCHWACHE MOORE

Romano, N., and Eyherabide, R. A. Some Neurological Pictures Due to Metastasis of Pulmonary Cancer (Algunos cuadros neurológicos por metastasis de cáncer pulmonar). *Rev méd d Rosario*, 1941, 31: 1.

The authors state that the metastases of many cases of pulmonary cancer present obtrusive symptoms contrasting with the modest bronchopulmonary symptoms and that this inconsistency must be kept in mind to avoid regrettable errors in treatment. Among their cases of metastatic cancer due to primary blastoma of the lungs, they have selected some observations in the field of neurology to show the caution that must be used in establishing the diagnosis of primary cerebral tumor in spite of the fact that the cerebral metastasis is the only clinical manifestation. Metastases may occur in any part of

the brain, but show a predilection for the cerebral hemispheres as only two cerebellar localizations were found among 10 observations. The metastatic nodules were single in 2 cases and multiple and differing in size, number, and distribution in the other cases. All were of epithelial nature, but their macroscopic characteristics varied in a few cases. Irid explains the frequency of cerebral metastasis by stating that the cancer cells of the lung can reach the central nervous system by way of the blood stream without encountering any obstacles, while those of any other part of the body are arrested in their migration by the pulmonary filter. The bronchopulmonary process was easily recognized by clinical examination in some cases, it was a roentgen finding in 1 case, an autopsy finding in 2 cases and detectable by careful investigation in the remaining cases. Four of the cases are described.

The first patient presented a typical cerebellar syndrome and a pulmonary condensation syndrome of the upper third of the lungs, roentgen examination showed a dense shadow occupying the upper half of the right lung, but bronchography was impossible because of vomiting at the slightest maneuver, secondary cerebellar localization of a primary neoplasm of the upper right bronchus was suspected and later confirmed at autopsy.

The second patient presented a neurological syndrome of cortical irritation and a bronchopulmonary respiratory syndrome, roentgen examination revealed on the right side pulmonary atelectasis, narrowing of the intercostal spaces, elevation of the hemidiaphragm, mediastinal retraction to the same side, and opacity of the upper third of the lung. Subsequent roentgen examinations confirmed the suspicion of pulmonary tumor and autopsy later showed a tumor of the upper right lobe and metastases to the first and second left temporal and right frontal convolutions.

The third patient presented spastic hemiplegia on the left side with intense pyramidalism, clonus of the foot, the Babinski sign, inexpressive facies, parkinsonian aspect, amnesia, and mental obtundation, there were some rales in the lungs, roentgen examination revealed only some reactional signs in the pulmonary parenchyma, but the cardiovascular shadow was displaced to the left, and the left side of the thorax was retracted. Autopsy gave the key to the puzzle by revealing a small endobronchial tumor, which did not obstruct completely the lumen of the bronchus, and a metastatic tumor of the size of a mandarine in the frontal pole of the right cerebral hemisphere with edematous and necrotic peritumoral zones.

The fourth patient presented a right hemiplegia, headaches and symptoms of cerebral hypertension, and signs of induration of the right upper pulmonary lobe, roentgen examination revealed an atelectatic shadow of this lobe, but further investigation was prevented by the condition of the patient. The diagnosis of pulmonary cancer with probable cerebral metastasis was made and later confirmed by

autopsy an epitheliomatous tumor was found in the right upper bronchus with atelectasis of the corresponding lobe while the lower part of the upper parietal convolution showed a tumor of the size of a quarter there was also a cystic dilatation of the pineal body

The 6 other cases were similar to the e described The cerebral tumors presented no predilection for certain zones

These cases show the importance of a careful examination of the respiratory apparatus

RICHARD KEMEL M D

MISCELLANEOUS

Denk W The Surgical Management of Hypertension (Ueb d chirurgische Beha dl ng der Hypo rt nie) H kl Hl ch ch 1940 8 7

The author discusses the need of operation for hypertension He states that whereas in Italy America and France many operations have been done in Germany there was considerable restraint until Vollhard and Nonnenbruch recognized the indications for certain cases These are that the patient be relatively young with severe symptoms eyeground changes and an elevated pressure that is not fixed Unfortunately the nature of hypertension is not yet clear The question involves discrimination between essential hypertension benign and malignant sclerosis and white and red hypertensions For example under essential hypertension Nonnenbruch recognizes only the benign sclerosis of Vollhard or red hypertension which however ordinarily first appears in the fifth or sixth decade and is compatible with good efficiency for many years For this operative treatment is not justified On the contrary according to him the early stages of malignant sclerosis or pale hypertension is a matter for operation Peet has the same viewpoint However one cannot be certain at this time which form is present

One thing is certain in general only patients under fifty years of age with a blood pressure of over 200 mm Hg should be subjected to operation The blood pressure must not be fixed but should decrease on reclining and especially during the night To determine whether or not the hypertension is fixed one may employ splanchnic anesthesia sodium amylate or an intravenous injection of a 5 per cent solution of pemothal These tests alone are not altogether conclusive The most important test is still the lowering of the pressure during sleep In the presence of otherwise mild subjective complaint retinal hemorrhages and edema of the retina or papilla are in themselves urgent operative indications as well as signs of cardiac damage Age of more than fifty years and levitation of the nitroge retention above 75 mgm per cent are contraindications Most surgical procedures are based on the assumption that hypertension is related to narrowing of the renal arteries The role of the suprarenal gland is a yet uncertain Through the work of Korschag and Kutcher of Aichbergen a

relationship between the blood pressure and the suprarenal glands was shown to be very probable for which reason an operative attack on the suprarenal glands was justified

Experimental work with animals led Peet to the conclusion that it is a question of sympathetic nervous disease with hyperirritability of the centers controlling vasoconstriction in the splanchnic region

Up to this time the following operations have been employed for the relief of hypertension (1) decapsulation and denervation of the renal pedicle (2) attack on the suprarenal gland (3) attack on the sympathetic system The latter is the most common method In his more recent work Nonnenbruch again recommends the first method for early cases Denk comments on how difficult it is for a surgeon to decide on a certain operation for a patient when the ultimate problems involved are as yet unsolved All three types of operation attack the sympathetic nerves Pende recommends a subdiaphragmatic sympathetic section on the left side and in case of failure adds a section of both splanchnics on the right side Adon Craig does a two stage bilateral resection of the splanchnic major and minor a part of the celiac ganglion and the two superior ganglia of the lumbar chain Peet does a bilateral one stage resection of the supradiaphragmatic portion of the splanchnics and of the chain from the ninth dorsal to the diaphragm By this means the major portion of the nerves can be resected a distance above all a preganglionic interruption can be established whereby the adrenal sensitivity of the vessels which controls after postganglionic section is eliminated

Whether or not these experimental results can be substantiated through clinical observation follows the different methods (supradiaphragmatic or subdiaphragmatic) is as yet undecided Pende has reported more than 500 operations by his method performed by Italian surgeons and has spoken of very great results (in statement of figures given) The Craig Adon subdiaphragmatic splanchnic resection has been carried out in more than 300 cases Among these cases 47 per cent showed improvement the mortality was very small Among the 300 cases operated upon by Allen Adon (at the May Clinic) none terminated fatally In 245 cases an accurate check could be carried out The blood pressure was good in 24 per cent and improved in 28 per cent 38 per cent showed only passing improvement and in 20 per cent the operation was a failure Of the patients in whom the blood pressure was lowered 80 per cent lost their nervous complaints and their headaches The eyeground changes disappeared only in some The degree of the sclerosis of the vessels is according to them a deciding factor of the outcome If no sclerosis was present the results were good or moderate in 83 per cent with sclerosis Grade I in 52 per cent with sclerosis Grade II in 53 per cent and with sclerosis Grade III in 2 per cent of the cases

Denk presents his own case a peculiar table these were also operated upon according to Adon

and Craig. They are also included in the collected statistics. Nine cases are presented. Three of the patients died with advanced malignant nephrosclerosis and very marked eyeground changes after from two to seven months. Three were significantly benefited and able to work, 1 showed passing improvement and died by suicide, 1 showed essential improvement but remained unfit for work, and 1 is still under treatment. The period of observation was long, from two to eight years.

Denk then presents Peet's statistics with his supradaphragmatic splanchnic resection in 375 cases. The observation period was from six months to five years. Subjective freedom from complaints was obtained in 76 per cent, 16 per cent showed moderate improvement, 8 per cent resulted in failure. The blood pressure could be lowered at least 40/25 in 48 per cent. In 57 per cent of the patients who previously showed a decrease in renal

function there was lasting improvement following operation. Lasting improvement was also shown in 76 per cent of the patients with eyeground changes. It was striking that even as in reports of other surgeons, subjective and objective improvement also occurred without a lowering of the blood pressure. Therefore Peet thinks it necessary to conclude that the elevation of the blood pressure as such is not so important but that toxic substances are elaborated in the ischemic kidney, the production of which is diminished as a result of the improved circulation. Consequently, the supradaphragmatic resection appears to be the better. Statistics can be deceiving, however. Collection of further evidence will be valuable as the surgery of hypertension is still in its developmental stage. Operation is no more difficult than denervation of the kidney pedicle, and the operative mortality is extremely small.

(TRANZ) JOHN I. LINDBQUIST, M.D.

SURGERY OF THE THORAX

TRACHEA LUNGS AND PLEURA

Monod O W F Lobectomy in Case of Injury to the Hilum of the Lung. *Report of 2 Cases*
J Thoracic Surg 1941 10 47

The author reports 2 cases of emergency pulmonary lobectomy for gunshot wounds of the hilum of the lung. The first patient had a self-inflicted wound in the left chest. There was evidence of massive hemorrhage into the thoracic cavity. Under light chloroform anesthesia the chest was opened and the pleural cavity emptied of blood. A perforating wound of the pedicle of a free left middle lobe was found to be bleeding. A forceps was placed on the pedicle and the lobe was removed. The stump was sutured with chain catgut sutures. There was also a perforating wound through the apex of the lower lobe which had ceased to bleed. The apex of the lower lobe was removed. The wound was closed without drainage and the patient made an uneventful recovery.

The second patient suffered from two self-inflicted bullet wounds in the left chest. There was evidence of a massive hemothorax. The patient was given light chloroform anesthesia, the chest was opened through the fifth intercostal space and the pleura was emptied of a large quantity of blood. An injury of one of the main branches of the left superior pulmonary vein was seen. A subtotal lobectomy of the left upper lobe was performed by mass ligation with silk and the chest wound was closed without drainage. During convalescence the patient developed appendicitis and an appendectomy was done. He recovered entirely.

Both of these patients reached the hospital and were on the operating table within thirty-five minutes of the injury, which probably accounts for the successful treatment. JULIAN A MOORE MD

Singer J J Jones J C and Tragerman L J
Aseptic Pleuritis Experimentally Produced
J Thoracic Surg 1941 25

Thirty rabbits were injected with various substances intrapleurally and the gross and microscopic effects were studied in detail. The authors showed that the intrapleural injection of talc, thymol iodide and bismuth formic iodide in saline solutions produced aseptic pleuritis in most instances.

Of these various substances, talc in whatever form administered had seemed to produce the most desirable changes in the simplest fashion. The usual gross features of the pleural reaction to talc were thickening, development of bands and fusion adhesions and mediastinal fixation.

Histologically, the reaction to the talc consisted principally in the proliferation of fibroblasts and macrophages with occasional exudation of other cells. Phagocytosis of foreign material by macro-

phages, the formation of aggregate giant cells containing foreign material and the accumulation of crystals in dilated lymphatic channels contributed to the focal thickening. Adhesions between the involved pleural surfaces were formed by connective tissue proliferation which yielded bridges of fine collagen lined with mesothelium.

The reaction to talc with the large particles used differed from that which followed the use of finely dispersed particles of silica or silicates. It was also sharply limited to the pleural cavity (unless injected elsewhere by accident) and regional lymph nodes showed slight if any change. There was no pathological evidence of toxic effect from talc injection.

The reaction of the pleura to bismuth formic iodide and thymol iodide was similar to but not as effective as that to talc.

Gomenol in cotton seed oil produced soft adhesions which were not as firm as those produced by the injection of talc.

Iodized oil produced a slight reaction in the pleura. The injection of beef broth finally killed the animal, produced only the slightest pleural reaction in twelve weeks.

The authors' observations have yielded some evidence that preliminary treatment of the pleura with the various substances used, particularly talc, protects the patient against the hazards of secondary surgical procedures. CHARLES BARO MD

HEART AND PERICARDIUM

Mohr H Lat Rulfs in a Case of Suture of the Heart with Ligation of the Descending Branch of the Left Coronary Artery (Späthlgang) II. Bericht mit Ueberblick des Resultates
d. Anat. r. an. s. ist. a. Zent. allg. f. Ch.
94 P

Heart sutures usually give good results. Dshanehidze reported good results in 96.3 per cent of his cases. Hesse an excellent outcome in 77.3 per cent and good results in 22.7 per cent. Frey stated that in 27 cases which were studied from six months to thirty-six years later the results were favorable aside from slight disturbances. The prognosis of observation have been for the most part too short. Of Dshanehidze's cases 50 per cent had been observed only up to one year. Above all it was assumed that the symptoms would improve with the passing of years. It is interesting that little significance appears to have been attached to the ligation of the coronary vessel although the electrocardiogram revealed definite changes immediately after the injury similar to those of coronary infarcts. These manifestations usually disappeared after a short time.

Mohr reports a case of stab wound of the right chamber of the heart near its junction with the

pulmonary artery. The descending ramus of the left coronary artery had to be included in the suture rather high. The electrocardiogram several days later showed marked changes as in coronary infarct, but these entirely disappeared after four and one half months. The man remained free from symptoms, and was able to work for four years, although at the end of three years the electrocardiogram showed, surprisingly, an old infarct of the anterior wall. Cardiac symptoms began after four years, with palpitation, dyspnea, and one attack with cramps in the arms. Examination revealed no cyanosis but there was enlargement of the heart to the right and tachycardia. The electrocardiogram showed the take-off of ST above the base line, T was weakly negative, and R₁ and R₂ were split. These findings indicated clearly an old anterior chamber infarct. There was, therefore, a probably beginning cardiac aneurysm. (TRANZ) IEO M. ZIMMERMAN, M.D.

ESOPHAGUS AND MEDIASTINUM

Kampmeier, R. H., and Jones, E. Esophageal Obstruction Due to Gummata of the Esophagus and Diaphragm. *Am J M Sc*, 1941, 201: 530.

Syphilitic lesions of the esophagus are known to occur, but they are very rare. The authors have reported 4 cases of esophageal obstruction, 1 the result of a gumma of the esophageal wall and 3 the result of gummatous lesions of the diaphragm at the esophageal hiatus.

The symptoms are those of esophageal obstruction. The diagnosis can be made only by means of serological and roentgenological examinations plus esophagoscopy and biopsy. The therapeutic test of anti-syphilitic treatment is decisive.

Three of the 4 patients reported were cured by anti-luetic treatment plus dilatation of the esophageal strictures. One case was diagnosed as carcinoma of the esophagus and the patient died without receiving appropriate treatment.

JULIAN A. MOORE, M.D.

MISCELLANEOUS

Phillips, F. J., Adams, W. E., and Hrdina, I. S. Physiological Adjustment in Sublethal Reduction of Lung Capacity in Dogs. *Surgery*, 1941, 9: 25.

The authors over a period of years have been studying the effect of reduction in lung capacity in dogs following lobectomy, pneumonectomy, and the production of atelectasis by means of bronchial strictures produced with silver nitrate solutions.

They have found that healthy dogs remain well and active after reduction of the lung volume to 15 per cent of normal provided the reduction is produced gradually. This reduction of lung volume is accompanied by a compensatory function. The remaining lung shows marked compensatory emphysema with stretching and fragmentation of the alveolar walls.

JULIAN A. MOORE, M.D.

THE SURGICAL MANAGEMENT OF DIVERTICULITIS OF THE COLON

A Five Year Collective Review

HAROLD LAUFMAN B S M D Chicago Illinois

ALTHOUGH the nature and incidence of diverticula of the large intestine have been studied since Littre's description in 1700 it is only within the twentieth century that successful treatment both medical and surgical has been widely reported. During the last thirty years an attempt has been made to formulate principles of treatment based upon accurate physiological and pathological information. The writings of the past five years have served to evaluate previously published methods in the light of an ever increasing amount of clinical material and more careful analysis of statistical data. Although no strikingly new developments in the treatment of diverticulitis have been described within this period the indications for treatment of this disease and its complications have been more precisely defined and extensively published.

There is general agreement in the literature that diverticulosis is a non surgical disease and often an incidental finding. When one or more diverticula become inflamed the condition known as diverticulitis is present. This may become a surgical disease which depends upon the development of complications.

Application of surgery to the treatment of diverticulitis received its impetus largely through the work of W. J. Mayo who together with Wilson and Giffin in 1907 reported 5 cases in which surgical removal of a portion of colon was done for diverticulitis. The trend since that time however has been toward conservatism especially in the presence of acute diverticulitis.

The incidence of diverticulosis averages about 5 per cent in persons over forty years of age and about 6 per cent in patients presenting themselves to medical examination because of abdominal symptoms (W. J. Mayo 73 Rankin and Brown 83). Men are more frequently afflicted with this disease than are women in the proportion of about 2 to 1. Although most patients are beyond forty years of age many instances have been recorded in younger persons and even infants (Bearse 8). The largest age group according to

Brown (12) Kocour (62) and others is found in the fifth decade while according to Cleland's series (19) in the sixth decade.

It is well known that acquired diverticula may occur in any portion of the colon or rectum or throughout the entire colon. However from 60 to 85 per cent are present in the sigmoid and descending colon (Dixon Deuterman and Weber 28 Rankin and Brown 83) and when complications requiring surgery supervene they almost invariably arise in diverticula of these portions of bowel (Ochsner and Barg 79).

Many theories have been advanced for the etiology of diverticulosis including old age constipation with increased gaseous pressure within the colon excessive fat or emaciation disturbance of the sympathetic nerves of the colon (24) and an inherent weakness in the structure of the bowel which is usually at the point of exit or entrance of the blood vessels (25 33 59 84). Bearse (8) states that the possibility of diverticula of the colon being congenital must also be considered since cases have been reported in young children and infants. Notwithstanding these and other conjectures no definite proof as to the origin of diverticulitis has thus far been produced.

It is impossible to determine with any degree of accuracy the percentage of patients with diverticula who develop diverticulitis (12) although this has been variously estimated from clinical data to be from 10 to 20 per cent. Of 1300 subjects in whom diverticula were found during routine gastro intestinal examination by Rankin and Brown (83) 227 were considered to have diverticulitis from which it would seem that 17 per cent of diverticula produce symptoms. In the autopsy series of 121 cases reported by the same authors there were 16 cases of diverticulitis (14 per cent).

The symptoms of diverticulitis are apparently due to inflammatory changes occurring in and around a diverticular sac as a result of inadequate drainage. Abell (2) reminds us that the fecal current in the right half of the colon is largely liquid while that in the left half tend to become more and more solid with the result that diver

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LAUFMAN DIVERTICULITIS OF THE COLON

ticula in the left colon more frequently show the presence of fecoliths which obstruct drainage and predispose to the development of inflammatory changes

Brown and Marcley (14) concluded that in one-third of the cases of diverticulitis, symptoms are the result of inflammation, and in two thirds, the result of obstruction plus inflammation. Provided the disease does not run a fulminating course to perforation of one of the diverticula, the symptoms are more or less classical. With acute inflammation in a single diverticulum the symptoms closely resemble those of appendicitis: pain, nausea and vomiting, localized tenderness and rigidity, and increased leucocyte count. The most typical symptom is pain, usually in the left lower abdominal quadrant. This is frequently associated with constipation. About 60 per cent of patients with diverticulitis give a history of constipation alone or constipation alternating with diarrhea (83). Bleeding is not a very common symptom, being present in from 5 to 17 per cent of cases (Abell, 1, Rankin and Grimes, 84). On rare occasions there is massive hemorrhage (Blackburn, 10, Friedenwald and Feldman, 39), and a purely hemorrhagic form has been reported by Germani, LeGallon, and Morvan (41). Tumor associated with diverticulitis is rather common (31 per cent) and is usually the result of inflammatory reaction around the diverticulum, with or without the formation of abscess (Rankin and Brown, 83).

Graham (43) summarizes the symptom complex of diverticulitis as follows: "The patient is over 40 years of age, and has suffered vague, recurring abdominal distress, mostly in the lower abdomen, often radiating into the rectum and relieved by the passage of flatus and stool. Constipation, with rare bleeding and occasional diarrhea is present in a fair proportion of cases. Almost all patients will give a past history of attacks of acute abdominal pain associated with fever."

Roentgenological study constitutes the most important aid in diagnosis, not only in locating the site of the lesion, but in determining as well the extent of the involvement (Abell, 1). There are nevertheless many instances in which roentgen diagnosis has failed. In Graham's series (43), the roentgen-ray diagnosis was correct in only 57 per cent of the cases. Characteristically, there is a serrated or "picket-fence" roentgen appearance of the colon (Stewart and Illick, 101). While the barium enema flows in, there is intermittent obstruction with left lower quadrant pain. Much has been written about the roentgenological differential diagnosis between diverticulitis and car-

cinoma of the colon (85, 93, 99, 101). The roentgenogram may show diverticulitis, and the lesion causing the symptoms may be carcinoma (T. E. Jones, 56). Yet with all the aids in diagnosis at the command of the diagnostician and roentgenologist, there were 29 per cent of diagnostic errors in Graham's series (43) of which 50 per cent occurred in the differential diagnosis between carcinoma and diverticulitis. The other errors were the diagnoses of acute appendicitis, perforated duodenal ulcer, and acute cholecystitis.

Sigmoidoscopy is of value in the diagnosis of diverticulitis only when diverticula can be seen with direct vision and confirmed with the roentgenogram. Jackman and Pumphrey (52) were able to accomplish this in 66 per cent of cases, but in only 14.5 per cent were sacculations directly visualized. In 22 per cent of cases, suggestive findings were observed proctoscopically, they included immobility, sharp angulation, narrowing of the lumen, mucosal edema, extrarectal mass, and inability to pass the proctoscope the usual distance. The observation of bleeding from above the reach of the instrument is of no conclusive value.

MEDICAL OR CONSERVATIVE TREATMENT

The treatment of the early stages of diverticulitis is not a surgical problem. Even if there is marked deformity of the bowel conservative management frequently causes the process to subside (Dixon, 27).

The medical management of an acute attack consists of complete bed rest and the administration of parenteral fluids in order to rest the inflamed colon and maintain chemical balance. Heat is of great value, and may be administered in various ways. Many authors recommend the application of hot packs or electric pads to the abdomen. Brown and Marcley (14) have used short-wave diathermy with success. Pemberton and Waugh (81) advocate the use of the Ellhot treatment, especially in women. Bearse (8) suggests either ice bags or heat placed at the seat of pain in the acute stage. While two-way rectal irrigations with hot physiological saline provide another valuable source of heat, such irrigations may prove irritating and increase the discomfort in some cases (14). Small warm saline (83) or plain water (56) enemas usually suffice to cleanse the bowel. In the acute stages, retention enemas of warm oil (cottonseed oil [110] or olive oil [12]), and glycerin suppositories (56) are often very comforting and help promote bowel movements. Liquid petrolatum (mineral oil), or olive oil by mouth have proved to be of definite value in most

cases Blackburn (10) however is convinced that water has more influence upon the consistency of the stool than has oil or fat and there fore agrees with Jones (54) that when tolerated plenty of water should be given orally. After subsidence of the acute symptoms patients should be warned to avoid irritating laxatives and an effort should be made to resume normal bowel movements (6).

As the acute stage subsides food should be given orally. This should be started gradually and be low residue or non residue in nature. As improvement is seen the diet can gradually be increased to a normal sensible diet (11). If the bowel habit is on the loose side Willard and Blockus (110) suggest caution in the use of very hot or cold foods or drinks.

Anti spasmodics are generally thought to be of value in the treatment of diverticulitis although some clinicians prescribe the drugs despite doubts as to their efficacy. Belladonna is the most popular of these drugs. Other anti spasmodics that have been recommended include stramonium (2) calcium (110) and hyoscyamus (24) either alone or in conjunction with belladonna. Bismuth subnitrate, barium sulfate and kaolin are also useful in cases without obstruction (56, 110).

Following subsidence of an attack attention to diet is recommended. However there is apparently no way by which further attacks may be influenced. Many chronic cases prove self limiting while others have repeated recrudescences regardless of treatment.

The results of medical management are difficult to evaluate. In one of the few large series reported recently Brown and Marcle (14) found medical treatment satisfactory in 63 per cent of the cases and unsatisfactory in 37 per cent. However in another series Brown (12) analyzed 92 recent cases of diverticulitis which required surgical treatment and found that in approximately one sixth of these cases symptoms developed rapidly and operation had to be performed within a month or less after the first sign of the disease. In fully one half of his cases operation had to be performed within the first year. In the remaining cases symptoms persisted with increasing severity for from one to ten years before operation was performed. Brown interprets this as an indication of the failure of medical treatment.

In Graham's (43) series of 44 cases coming to surgery 1 patient had recurrent attacks over a period of fourteen years, 10 had a history of five or six years and 33 (75 per cent) had symptoms for one year or less. Only 14 of the 44 patients had no remission from the onset until surgical mea-

sures became necessary while 30 gave a history of definite acute attacks. Thus 66 per cent of the patients coming to surgery in this series had a chronic recurrent abdominal disease.

The age and sex incidence of patients with diverticulitis requiring surgery has a close relationship with the actual age and sex incidence of the disease (Table I).

TABLE I — AGE AND SEX OF PATIENTS OPERATED ON FOR DIVERTICULITIS OF THE COLON FROM 1919 TO 1938 INCL (BROWN)

Sex	Age					
	20 to 30	31 to 40	41 to 50	51 to 60	61 to 70	71 to 80
Men (83%)		7	34	5	5	
Women (60, 3%)						
Total (143)		7	34	5	5	

Bearse (8) has calculated that for the entire population the incidence of operation for diverticulitis would be about 186 cases per 100,000 and that for patients under thirty years of age no more than 5.7 cases per 100,000 would require surgical intervention. In general the percentage of patients with diverticulitis who will eventually receive surgical treatment is variously reported from 15 per cent by Bargen and Coffey (6) to 26 per cent by Brown and Marcle (14).

THE SURGICAL TREATMENT OF DIVERTICULITIS

When a diverticulum and its surrounding structures become inflamed various complications which require surgical intervention may arise. For the purpose of this review these complications will be classified as follows:

1. Acute perforation of a diverticulum
2. Peridiverticular abscess (chronic perforation)
3. Obstruction
4. Fistula formation
 - (a) Colovesical fistula
 - (b) Enter-enteric fistula
 - (c) Fistula into abdominal viscera other than the bowel
 - (d) Abdominal wall fistula
 - (e) Fistula into tissues of the posterior abdominal wall and pelvis
5. Other disease processes

ACUTE PERFORATION

The most dreaded but fortunately the least frequent (83) complication of diverticulitis is the sudden perforation of a diverticulum into the free

peritoneal cavity which causes generalized peritonitis. This complication is rare because peridiverticulitis usually serves to wall off the impending rupture by drawing loops of small bowel to the sigmoid, or fixing the sigmoid to the lateral parietal peritoneum, bladder, or anterior abdominal wall. Consequently, penetration and abscess result more commonly.

In Ochsner and Bagen's series (78), acute perforation occurred in only 2.4 per cent of the total cases of diverticulitis. On the other hand, Graham (43) reported that in 11 of 44 cases (25 per cent) of diverticulitis coming to surgery, acute perforation had occurred and necessitated an emergency operation. Among 127 cases of diverticulitis coming to autopsy, Kocour (62) reported 4 deaths from perforation among 8 fatalities directly attributable to diverticulitis.

Although practically all acute perforations of diverticula occur in or near the sigmoid, they may occur elsewhere in the colon. Abell (1) reported an acute perforation of a diverticulum of the appendix. Erdman (34) recorded 2 cases of multiple perforations. The patients were operated upon for each perforation, and the gangrenous diverticula were found in demonstrably different areas.

In the acute fulminating variety of intraperitoneal perforation of a diverticulum, the symptoms are so alarming that an emergency operation becomes necessary. The resulting diffuse suppurative peritonitis is not distinguishable from that produced by other infectious lesions. The pre-operative diagnosis is generally that of acute appendicitis (Visconti, 106), volvulus, or perforation of a viscus (Jones, 56). Very frequently the sigmoid is in the midline or on the right side.

Graham, Erdman, Jones, and others emphasize that in determining the treatment, the same principles are applicable as in any acute intraperitoneal disease. First, one must correct the biological disturbances which inevitably accompany the disaster by the intravenous administration of fluids and salt, the local application of heat, and the administration of sedatives. A delay of some hours while such therapy is being carried out is perfectly justified by the results.

Because in the vast majority of instances acute perforating diverticulitis presents somewhat atypical symptoms of acute appendicitis, the surgeon unfortunately will usually use a McBurney incision or a right rectus incision. Rankin (84) points out that if this is done, the danger lies in the exploration which is undertaken upon finding a normal appendix. This may spread the infection and, because of the difficulties present the

exploration itself may become a formidable procedure. He therefore suggests that if such an incision has been made, it should be closed immediately and a low midline incision substituted for it.

Once the perforated diverticulum is exposed, there is some difference of opinion as to how to deal with the pathological changes at hand. Abell (1) believes that, if local conditions permit, an attempt should be made to repair the perforation, and adds that a certain percentage of these attempts are successful, while the remainder of the cases, like those treated with drainage alone, develop fistulas. Rankin and Brown (83) remove the offending diverticulum, if possible, close the opening loosely with interrupted sutures, and drain the peritoneal cavity. Erdman (34) concurs in this opinion, adding that in those acute cases in which a mass has not formed, attempts at repair are in order. Cornwall (23) emphasizes this point of view by maintaining that generalized peritonitis due to a ruptured diverticulum should be treated as that arising from a ruptured ulcer or appendix, i.e., by closure of the exit of the septic material from the intestinal lumen, free evacuation, and drainage.

Opposing this form of treatment are a number of surgeons who do not believe any attempt at repair should be made. Jones (56) believes that the immediate responsibility is to save the patient's life, and therefore advises the procedure which most simply accomplishes this purpose: incision and drainage. No attempt is made to close over the perforated area, because the sutures will not hold in the edematous, infected bowel wall. Furthermore, it is traumatizing and time-consuming and may conceivably break down protective barriers. Graham (43) also follows these principles by performing simple drainage, using a rubber tube surrounded by gauze soaked in liquid paraffin and "bipp".

Some surgeons prefer a more formidable procedure, namely, exteriorization of the loop bearing the ruptured diverticulum. Marshall (72), Black (9), and others consider this the best form of treatment, but Marshall adds that when the bowel cannot be exteriorized, simple anchorage of the affected segment under the incision and rubber-dam drainage down to the bowel is comparatively safe.

Since a fistula frequently follows closure and drainage, Rankin (84) supplements this with a colostomy which shunts the fecal current and allows inflammatory changes to regress. He claims the procedure takes but a few minutes and is not traumatizing. However, Graham and Jones point out that one of the contributing factors to

the high mortality in this condition is an unduly extensive procedure. A coincident colostomy is often unnecessary and in addition may be difficult to close. If the obstruction is severe enough to require decompression of the proximal colon it is considered better by some to do a cecostomy.

Slesinger (94) has shown that the prognosis depends on the interval that has elapsed between the time of the perforation and operation. Jones believes that if the surgeon does not see the patient until after twelve or twenty-four hours the question of expectant symptomatic treatment must be carefully considered and suggests the judicious use of sulfanilamide.

PERIDIVERTICULAR ABSCESS (CHRONIC PERFORATION)

Abscess formation with localized peritonitis is the most common complication of diverticulitis (83). It is universally agreed that this condition demands surgical intervention although there is still some difference in opinion as to which surgical procedure to follow.

The chronic (gradual progressive) type of perforation with formation of peridiverticular abscess must be differentiated from carcinoma of the colon. In favor of abscess is a history of several previous attacks with pain and elevation of the temperature. Constipation is the rule and blood is found in the stool only occasionally. Rectal examination will reveal a tender mass in the pelvis. In the female such cases are frequently called tubo-ovarian abscess (Wetherell 109). In men early symptoms may point to the genito-urinary tract with frequency and pain in the lower part of the abdomen which is referred to the kidney. This is due to the proximity of the inflammatory process to either the bladder or ureter. Jones (55), Stenstrom (99) and Renander (85) warn against the injudicious use of roentgenography when an abscess is suspected.

In 1929 W. J. Mayo (73) advised that an abscess resulting from diverticulitis should be evacuated immediately and some surgeons rigidly adhere to this principle. The trend in the past few years however has definitely been toward conservative management when possible before resort is made to surgical intervention.

Wetherell (109) is convinced that proper conservative treatment will often allow the complete subsidence of an abscess and of marked inflammation of the colonic wall. Slesinger (94) believes medical treatment offers a good prognosis but must be persisted in until all tenderness and pyrexia have disappeared and must be followed by careful prophylactic measures. These views are

shared by many present-day surgeons (Abel 1, Smeaton 95).

If the abscess does not subside surgical intervention must be considered. The usual procedure is simple drainage. Bailey (4) emphasizes utmost care in technique with sharp dissection careful walling off and bringing the drain tubes out through a separate left groin incision after approximating the omentum to the left iliac fossa and folding the apron around the drains. Drainage may be done abdominally retroperitoneally or rectally (Weible 108) and depends upon the location of the mass and the experience of the surgeon. Vaginal drainage is contraindicated because of the possibility that a persistent fecal fistula may follow such drainage.

On rare occasions the surgeon may be confronted with a problem which will compel him to do a radical operation in the presence of infection. After the foul pus of the abscess is removed by suction a large necrotic defect may be revealed in the sigmoid. In such cases closure of the defect is impossible and transperitoneal drainage may lead to fatal peritonitis. This leaves resection of the Mikulicz type the only reasonable alternative (18) provided liberal drainage is allowed.

If the abscess is associated with obstruction diversion of the fecal current is indicated. Although some surgeons still prefer to do a colostomy in the descending colon most writers recommend making the stoma in the transverse colon. Other prefer cecostomy. Wetherell (109) states that a colostomy adds from 50 to 75 per cent to the mortality. Shipley and Gerwig (92) however do not believe cecostomy adequately diverts the fecal current.

After drainage with or without colostomy adequate time should be allowed for healing. This period may be from two to four months or several years. After this period resection may prove necessary if the disease does not subside entirely.

The important point repeatedly found in the literature regarding the treatment of peridiverticular abscess is that radical surgery should not be attempted in the presence of acute inflammation, unless absolutely indicated. When adequate time has elapsed after drainage the surgeon is in a better position to determine whether the affected segment should be removed or whether the resulting fistula should be allowed to heal or be closed surgically.

OBSTRUCTION

Although much has been written about the management of this complication of diverticu-

litis, there is by now almost universal agreement, at least in principle, as to the therapeutic course to follow

Obstruction in acute diverticulitis occurs as a result of infection and edematous thickening of the gut wall and of the mesocolic and surrounding fat. Acute obstruction is usually associated with acute diverticulitis, although it may also occur in chronic diverticulitis. In other words, a sudden, acute obstruction may arise even though the infectious process has been present in varying degrees for some time. Obstruction may develop while waiting for an abscess to point (56)

W J Mayo (73) believed that for acute obstruction due to diverticulitis, a colostomy should be performed immediately, and as close to the obstructed point as convenient, so that at a later operation the stenosed portion of the sigmoid and the colostomy opening may be excised together.

The trend in the past few years, however, has been toward postponing operation as long as possible.

Obstruction of the terminal colon is not of the same serious import as obstruction of the small intestine. As a rule this obstruction is preceded for several days by a gradually increasing partial obstruction, with cramps, followed by the expulsion of gas and either solid or liquid feces, with temporary relief. During this stage Wetherell (109) urges complete rest in bed, liquid diet, or even entirely parenteral fluids. This regime for one or two weeks will, in the majority of cases, in a first or second attack, result in recession of the inflammatory condition and re-establishment of a lumen sufficient to permit passage of fecal material. Complete low obstruction may be tolerated for from ten days to two weeks, and these patients, too, will usually respond to non-operative measures. Abell (2) agrees with this principle, but when the obstruction is complete, prefers to do a colostomy rather than wait.

When operation is done, the site of the colostomy depends upon the site of the obstruction and the procedure the surgeon proposes to follow after the inflammation has subsided. Jones (56) does a left inguinal colostomy if the process is low in the sigmoid. If the mass is definitely palpable in the left lower quadrant, he advises a transverse colostomy. Edwards (32) has very little faith in the value of colostomy in the treatment of obstructive diverticulitis, but when it is inevitable, prefers to do it as close to the inflammatory site as possible.

Some surgeons elect to do a cecostomy or ileostomy in order to stay as far away as possible from the inflammatory site. Another advantage

of this form of treatment is that it prevents other diverticula above the offending lesion from becoming inflamed.

If while waiting for an abscess to point, obstruction develops, and if the process seems to be localizing otherwise, a cecostomy or transverse colostomy should be done (56), and at the appropriate time, a left McBurney incision made and the abscess drained.

Chronic obstruction is due to hyperplasia, adhesions, and angulation. This obstructive type of diverticulitis is most frequently mistaken for carcinoma of the colon (Slesinger, 94). It is characterized by gradually increasing constipation progressing to obstruction, associated with pain and tenderness in the left iliac fossa, pyrexia, and sometimes the presence of a tumor.

In such a case, clinical judgment alone decides the optimum time for surgical intervention. The duration of the ailment, the general condition of the patient, the degree of distention, and the presence of vomiting, all must be considered in the decision. If conservative management has been given a fair trial and has failed, the operation of choice is a colostomy some distance above the mass.

The usual interval treatment should be carried out, and, after convalescence, progress studies by means of the roentgenogram and the sigmoidoscope will determine the future course to be taken. Many authorities believe that the stoma should not be closed before a year has elapsed. Obviously, one must be sure before closing the colostomy opening, that there is no remaining obstruction. If the colostomy is closed, the patient must be put on rigid bowel management in an effort to avert further trouble.

If complete healing does not take place, resection must be considered. The choice of procedure depends upon the condition of the patient and the extent of colon involvement. Jones (56) has suggested that if the process is limited to 4 or 6 in., resection of this segment should be considered, but if the roentgenogram shows the process to be more extensive, resection may not be advisable. In such cases, permanent colostomy is recommended. If the patient insists that the colostomy be closed, he should be warned of the possibility of recurrence.

For the excision, an operation of the Paul-Mikulicz type is apparently the safest (Slesinger, 94). However, Rankin and Brown (83) have found that the most frequently performed operation has been removal of the affected sigmoid with end-to-end anastomosis. In a few cases Jones (56) has found it possible to do a primary Mikulicz

operation but hastens to warn that the mobilization may not be wise in most cases

FISTULA

A peridiverticular abscess may perforate (a) into the urinary bladder (b) into the adjacent bowel (c) into abdominal viscera other than the bowel (d) through the anterior abdominal wall and (e) into tissues of the posterior abdominal wall and pelvis. The perforations result in fistulas between the bowel and these organs or tissues. Fistulas to the anterior abdominal wall are frequently the sequel to surgical drainage of a peridiverticular abscess.

Colovesical fistula (so called vesicocolic fistula) According to Doherty (26) there are two types of colovesical fistulas resulting from diverticulitis: (1) those due to abscess formation with a long track to the bladder and (2) those which result from the obstructive type of diverticulitis in which there is a short track through which a great part of the fecal stream passes into the urinary bladder.

Edwards (3) observed that colovesical fistula was five times more common in men than in women (in women the bladder is largely protected by the uterus and the fallopian tubes) and that the ages ranged from forty-four to sixty-nine years. In Rankin and Brown's series (83) of 48 surgical cases of diverticulitis 7 or 14.5 per cent of the patients had fistulas into the bladder although 13 or 26 per cent had urinary symptoms. This coincides with Brown's series (12) in which 30 or 15 per cent of 191 patients on whom surgical treatment was employed developed colovesical fistulas. Gouverneur, Soupault and Latifi (42) found such fistulas in 38 or 11 per cent of 324 cases of diverticulitis of the sigmoid and Lockhart Mummery (67) encountered this condition in 12 of 91 cases of diverticulitis upon which he operated. Higgins (48) reviewed 38 cases of colovesical fistula in 1936 of which 160 were in inflammatory origin. Of these 51.5 per cent had diverticulitis of the sigmoid and rectum as their initiating cause.

Abdominal symptoms usually precede the urinary symptoms by a considerable length of time. Edwards (32) found the appearance of a colovesical fistula was preceded by abdominal symptoms by three years and nine months on the average.

The treatment depends upon several factors although again the trend is for the most part toward conservatism and there is general agreement as to the procedures advocated.

The first essential in the treatment of colovesical fistula is to prevent fecal material from reach-

ing the fistulous tract. Colostomy is therefore usually advised either high in the sigmoid in the transverse colon or cecum. If an abscess is present it should be evacuated and complete subsidence of the disease should be awaited before attempts at repair are instituted. Slesinger (94) warns that unless the cystitis is speedily relieved renal infection and death frequently follow. After the preliminary colostomy the usual period of interval treatment is undertaken; this treatment includes heat irrigations and dietary measures in order to allow complete quiescence of the inflammation.

While the operative correction of colovesical fistula may in some instances prove relatively easy in others it entails difficult and hazardous procedures. Dixon (27) believes that a colon resection with closure of the bladder opening is almost invariably necessary. If the opening is located low down in both organs the difficulty of access combined with the inflammatory infiltration makes its correction very hazardous. In such cases Abell (1) elects to do a permanent colostomy and claims satisfactory results.

Jones (56) depends largely upon the barium enema and cystoscopic and cystographic findings to decide upon which course to follow. From roentgen findings one can decide whether to close the colostomy if the bladder fistula is closed or resect the process before the colostomy is closed. The choice of procedure depends upon the amount of bowel involved. If the segment is short resection is the treatment of choice. If it is long it is advisable to keep the colostomy for a long time even if the fistula has closed spontaneously.

Rankin and Brown (83) are inclined to perform the surgical procedure in one stage by closing the two openings and hoping for primary union but they add that a graded operation, namely, colostomy first and subsequent attention to the fistula may be done with lower mortality and more satisfactory end results. C. J. Mayo (73) recommended interposing omentum between the bladder and bowel and around the latter which is finally sutured to the abdominal wall. Dixon (27) often supplements resection with a suprapubic cystostomy which is allowed to function for from three to five weeks.

Enteric fistula Perforation of a peridiverticular abscess into the rectum is a fortunate occurrence (36, 54) and brings about sudden relief from pain. A fistula may persist for a short while after rectal evacuation of the abscess but will soon heal under conservative treatment.

No reports are available regarding fistulas to the small intestine due to diverticulitis of the

LAUFMAN DIVERTICULITIS OF THE COLON

colon, but in Rankin and Brown's series (83) 1 such case was successfully operated upon by simply breaking down the adhesions and closing the fistulas in the intestine

Fistula between colon and adjacent viscera other than the bowel Harries (47) reported the perforation of a peridiverticular abscess into an ovarian cyst, with recovery after drainage. Kocour (62) described a perforation into the cervical canal of the uterus in a patient who died after the abscess ruptured into the free peritoneal cavity. Weible (107) warns against draining an abscess due to diverticulitis through the vagina because of the danger of a colovaginal fistula, but reports no such cases

Anterior abdominal-wall fistula Whether a peridiverticular abscess ruptures spontaneously or is opened surgically, a fistula generally results. Some fistulas which are the result of surgical drainage of an abscess are of small caliber and frequently heal spontaneously (2). However, Barga and Coffey (6) point out that it may not always be wise to allow this to happen. The infectious process in the bowel must be completely healed before spontaneous closure of the fistula should be permitted

In persistent fistulas, surgical closure usually fails unless a colostomy is done proximally before closure of the fistula is attempted. Many persistent fistulas will heal spontaneously after the fecal stream has been diverted by this procedure. Dixon (27) advises waiting from four to six months after abscess drainage for the resulting fistula to heal. If healing does not occur within this period, he recommends that colostomy be done. Jones (56) observed that nothing should be done about fistulas in patients who did not require a colostomy, because they usually close spontaneously even after as long as fifteen months. The fistula is very little nuisance, generally discharging pus, but rarely any fecal material

If after colostomy, the fistula does not heal spontaneously, and the question of surgical closure arises, Jones (56) recommends injecting the sinus with bismuth and by means of a barium enema determining the extent of the process in the colon. If a small segment is involved, resection of that segment including the fistula may be undertaken before the colostomy is closed. He believes it is not good surgery to dissect out the fistula down to and including the diverticulum and to try to close the bowel over, because it will fail in most cases, and the fistula will reform. If the entire sigmoid is involved, the patient should be encouraged to keep the colostomy, but refusing this, he must realize that the abdominal sinus will

probably be permanent. This causes little inconvenience provided it is kept open and allowed to drain. Barga and Coffey (6) advise saline irrigations of the idle lower loop for three months or more in an attempt to further heal the process in the colon. Dixon (27) believes in surgically closing the fistula after colostomy has been done, provided the extent of the diverticulitis does not demand a segmental resection

Fistula from colon to tissues of the posterior abdominal wall and pelvis A diverticulum of the upper rectum may perforate into the surrounding tissues, resulting in a sinus to the ischiorectal space which simulates an ischiorectal abscess (34). Jones (56) warns that it is well to bear in mind that a chronic fistula in and around the rectum which has been attributed to a fistula-in-ano or to a pilonidal sinus may have its origin in diverticulitis of the lower sigmoid. He therefore recommends injection of every chronic, recurring, complicated fistula-in-ano before operation. Lyall (71) reported a psoas abscess resulting from a ruptured diverticulum of the sigmoid, which extended down the inguinal ligament into the thigh to a point just above the knee

OTHER DISEASE PROCESSES

Pylephlebitis Often unrecognized is the pylephlebitis around an area of diverticulitis. David and Gilchrist (26) report 2 such cases. Cooke (22) reported a case diagnosed ante mortem as Weil's disease, which proved at autopsy to be one of diverticulitis terminating in pylephlebitis of the inferior mesenteric and splenic veins, with multiple abscesses in the liver

Chronic septic foci Spriggs (97) found chronic septic foci elsewhere in the body in 44 of 152 cases, which he attributed to diverticulitis as the source of infection. Lockhart-Mummery (67) found similar complications in 14 of 136 cases, and was convinced that the original diverticulitis was responsible, especially as none of 13 patients successfully treated by resection developed such foci. These included arthritis, endocarditis, septic iritis, and brain abscess. Coleman and Capps (20) attempted to trace the source of such infections, by roentgenographic studies of the bowel and stool cultures. In only 2 of 11 cases of diverticulitis were they unable to isolate streptococcus hemolyticus from the stools

Carcinoma Since Moynihan in 1907 first called attention to the mimicry of carcinoma by diverticulitis, much has been written about a possible relationship between these diseases. It has been shown beyond question, however, that there is no causal relationship between diverticulitis and car-

cinoma. Reports have shown a concomitant incidence of these two conditions varying from 15 to 8 per cent (Abell 1). This is generally interpreted as a coincidence rather than assuming that diverticulitis is a precursor to carcinoma.

However the differentiation between carcinoma and diverticulitis is often extremely difficult not only clinically (Schwarz 90) but often at the operating table. Because of adhesions to the urinary bladder it is sometimes difficult to decide whether carcinoma is invading the bladder or whether the mass is purely inflammatory or whether it is carcinoma plus diverticulitis (42). The error of undertaking a radical procedure in one stage for diverticulitis is sometimes due to the impression that the pathological changes present are due only to carcinoma. On the other hand there are probably many cases of supposed long term cures of carcinoma of the lower colon after simple colostomy which were in reality cases of diverticulitis (W. P. Jones 57). Rankin and Brown (83) are of the opinion that when carcinoma is believed to be present even though one may not be absolutely sure of it resection is indicated.

Other diseases In Kocour's autopsy series (62) he found that the incidence of lesions of the gall bladder in patients over forty years of age was doubled in those with diverticula. However the incidence of peptic ulcer or of carcinoma was not altered by the presence of diverticula.

Abdominal surgery in the presence of diverticulitis: David and Gilchrist (26) have pointed out some of the hazards of surgery on the left half of the colon in the presence of diverticulitis. In the one stage abdominoperineal resection for carcinoma one may be considerably hindered by firm adhesions of the sigmoid loop to the peritoneum

of the small pelvis and bladder caused by peridiverticulitis. Thus when the sigmoid is finally freed there is little peritoneum of suitable quality left for peritonization.

Diverticula may be inadvertently opened when mobilizing the sigmoid in a Miles resection when ligating appendices epiploicae (26) or when severing the meso-appendix in the performance of an appendectomy (1). Such occurrences may result in fecal fistula localized peritonitis or fatal peritonitis.

The increased intra abdominal pressure produced by leaving the ligature or clamps on an end colostomy for from one to three days may result in perforation of a diverticulum. Deep abdominal wall infections with reflex ileus following surgery on the colon are often the result of contamination from an opened or traumatized diverticulum.

MORBIDITY AND MORTALITY

Statistical material on the mortality and end results of the surgical management of diverticulitis is somewhat meager since there are very few large series of surgically treated cases of diverticulitis. Furthermore various authors analyze their mortality statistics from different approaches so that an average cannot be drawn from these series. Also there are very few follow up studies from which the end results after the various operative procedures can be estimated.

However several of the largest series published in recent years do lend themselves for comparison if the procedures are divided into conservative and radical operations. Conservative operations include colostomy alone, colostomy and subsequent closure of the colostomy, cecostomy, drainage of abscess, exploratory laparotomy, separation of adhesions, excision of inflamed diverticula.

TABLE II—MORTALITY RESULTS FOR OPERATIONS PERFORMED FOR DIVERTICULITIS OF THE COLON AND ITS COMPLICATIONS

A h	N t a b e l e a r p e r a d	C o n t e n t s				R e d u c t i o n				T o t a l	
		N	P	M e a s u r e		N	P	M e a s u r e		N	P e r c e n t
				N	P			N	P		
R k & B w	5	5				5	68.8	6	8	6	5
Brow & M l y	58	4	5	3	5	8	5.6		68		47
Lockh Mummy	9		8				8				
B ow		5	5	5		8				15	8.8
T E Jones	6										
T a l					8					60	

and repair of colovesical fistula not involving resection. Radical operations include the various procedures involving resection of the diseased portion of colon, such as resection after preliminary colostomy, Mikulicz type resections, resection and anastomosis, obstructive resection with subsequent closure of the colostomy, and one-stage resections (See Table II).

Obviously, this method of tabulation is open to criticism, but, nevertheless, it reveals several interesting features. The average mortality for conservative operations was 11.8 per cent, ranging from 7.5 to 14.3 per cent. Radical operations performed for diverticulitis carry an average mortality of 21 per cent, ranging from 18.2 to 23.3 per cent, when both one-stage and two-stage procedures are grouped together. Upon analysis of individual reports it was found that the Mikulicz type resection apparently carried the lowest mortality of the radical procedures. Resection and anastomosis, and obstructive resections with subsequent closure of the colostomy were found to have a combined mortality of about 25 per cent.

Unfortunately, as stated, there are few statistical reports regarding morbidity (failures, fecal fistulas, reports of "not well") following operations for diverticulitis of the colon. The only comprehensive report of such statistics is that of Brown (12), which is of considerable value in determining the fate of these patients, especially when combined with a few isolated reports of smaller series. Total failures after conservative operations were found to average 32 per cent, while those following radical operations averaged 9 per cent.

It might, therefore, be assumed that although radical operations have twice the mortality of conservative operations (21 and 11.8 per cent, respectively) in the treatment of complicated diverticulitis, the percentage of failures following radical operation is about one-third that following conservative procedures.

This must not be construed to mean that radical operation is necessarily the procedure of choice, despite its higher mortality, because it effects a greater number of cures. It might rather be interpreted to mean that if further radical therapy becomes necessary because of failure of more conservative measures, an additional mortality of 20 per cent must be anticipated, as must, also, a number of cases (9 per cent) which will fail to be cured. However, if a radical procedure is attempted without a preliminary conservative operation, a still higher mortality must be expected. For all operations done for diverticulitis, Brown found an average mortality of 18.3 per

cent, and total failures amounting to 17.8 per cent.

That the mortality rate has diminished sharply in the past two decades is evidenced by comparing Lockhart-Mummery's recent series (67) which had a 14 per cent mortality, with his report of 1910 (66), in which there was a 46 per cent mortality.

TABLE III — RESULTS OF SURGICAL TREATMENT IN 191 CASES OF DIVERTICULITIS (BROWN)

Results	Years since operation				Total
	0 to 5	5 to 10	10 to 15	15 to 20	
Patients cured	34	25	21	4	84
Symptoms persist	21	6	6	1	34
Related deaths	53	2			55
Deaths from unrelated or unknown causes	16	7	4		27
No data					11

The late results are governed by many factors, the chief one being the fact that many patients are in the sixth or seventh decades of life. Brown, in analyzing his data (Table III), found that 56 per cent of the 180 cases in which follow-up data were obtained, were benefited by operation. Even in many of the cases in which symptoms persisted, the patients were not invalids, and many would have died had they not been treated surgically. Sixty-one of Brown's patients lived at least five years or more. Even though a patient has a persistent fecal fistula or colonic stoma he is fortunate in being free from pain and able to carry on usual duties.

From the available data it may be assumed that of 200 patients with complicated diverticulitis, two-thirds or 134 will be benefited by medical treatment. Of the remaining 66 patients, about 33 (17 per cent of the total) will undergo surgery. After a primary (conservative) operation, 4 (12 per cent) will die and 12 (32 per cent) will not be cured, while the remaining 17 patients will be benefited. If 15 patients (10 uncured and 5 benefited by conservative operation) are then subjected to a radical (resection) operation, 3 (21 per cent) will die and 1 or 2 (9 per cent) will go on having symptoms despite all their treatment. Add to these the failures after conservative operation not followed by radical operation, and one is confronted with a total of about 18 per cent of failures following surgery for diverticulitis of the colon, and a total operative mortality of about 16 per cent.

SUMMARY

It is generally accepted that diverticulosis *per se* produces no symptoms and warrants no treatment. In the early stages of diverticulitis surgical intervention is not usually indicated. With the supervention of such complications as acute perforation, abscess, obstruction or fistula the treatment may become surgical. The trend in the past five years has been toward conservative management and the prevention of operation whenever possible.

Complications may develop in spite of competent medical treatment but because of the high mortality attending the surgical approach and the incidence of failure after operation surgery should be avoided whenever possible. It must be recognized that frequently prolonged hospitalization and graded operations may become necessary. This introduces an economic factor which should be considered before surgical treatment is resorted to in chronic cases of diverticulitis.

Emergency surgical interference may become necessary when acute perforation of a diverticulum occurs. In chronic complicated cases surgery may have to be resorted to if medical measures fail. In either case it is agreed that the surgical procedure undertaken should be of the most conservative type which will adequately deal with the disease. This usually consists of drainage or colostomy or both. If there is not complete subsidence of the disease process after months of interval treatment the involved segment of bowel may have to be resected. It is emphasized that care must be taken in selecting cases suitable for resection.

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SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

Junghanns H and Juzbasic D M Closure of Large Hernial Apertures by a Skin Flap Plastic Operation (Verschluss g s Bru hpf i n d rch C u l ppe plastik) Ch g 1940 12 74

The skin flap plastic first improved by Loewe and later by Rehn has again been taken up with satisfactory results and carried out in more than 30 cases. Its field of application includes the large abdominal cicatricial hernias and recurrent hernias, the umbilical hernia, and large hernias of the lower white line and occasionally the recurrent inguinal hernias. The special advantage of the skin flap lies in the fact that it is firmer than every fascial flap, that it is always available in the human body in sufficient amount and that it can be taken from the operative site itself.

The skin site intended for the removal of the skin flap requires an eight-to-ten days preliminary treatment with soap and brush, a twice daily rubbing with a 5 to 10 per cent alcoholic tannin solution and the application each time of a renewed sterile dressing. No signs of irritation were observed from this treatment. The corresponding large skin flap is freed of epididymis by repeated scraping and separated from the fatty tissue.

In the exposure and preparation of the actal hernia, attention must be paid to the most extensive restoration possible of the abdominal wall. The suturing of the flap is done under rigid tension, with overlapping of the flaps toward both sides and with the scraped epididymal layer upward in order to lead rising infections outward. The great danger with submerged skin flaps is the infection, which is best combated by the preliminary treatment mentioned.

Bacteriological tests in 12 examinations revealed sterility of the skin flap only 3 times and white hemolytic streptococci were strikingly common. The permanent results were satisfactory. Two illustrations elucidating the text and 4 pictures of an abdominal cicatricial hernia cured by a skin flap are shown in the original article.

(MIAKOWSKY) LOUIS NEUWELT M D

Moore T Mesenteric Vascular Occlusion B J J S g 94 8 347

Occlusion of the mesenteric vessels by no means a rare occurrence. The mortality resulting from the disease is still very high and can be reduced only by early recognition and treatment.

Although anemic infarction may occur in mesenteric infarction occurs more commonly. In most cases the bowel is swollen, gray and usually of a dark venous red color. The mesentery has similar changes. Microscopic examination shows that the bowel wall is completely infiltrated with blood.

Venous obstruction occurs in 75 per cent of the cases of circulatory obstruction. When arterial obstruction occurs it is due either to embolism or thrombosis. Thrombosis is always the cause of the venous obstruction. The two main factors responsible are portal obstruction and peripheral sepsis.

The disease is characterized by the sudden onset of central abdominal pain, shock, severe colic, nausea, vomiting and either complete intestinal obstruction or the repeated passage of bloody feces. As the condition progresses distention, fecal vomiting, dehydration, low blood pressure, a rapid feeble pulse and abdominal tenderness with rigidity are observed. It is uncommon for the disease to be correctly diagnosed before operation.

Moore urges immediate abdominal exploration as soon as the patient can be made safe for surgery, as possible. He believes that excision of the affected bowel and mesentery should be done even in desperate cases. If the patient dies on the table it is certain that no good would have followed dearterialization.

The author's experience shows that he has been observed. In 7 operations was done with a resulting mortality of 60 per cent. LA L GARWOOD M D

GASTRO INTESTINAL TRACT

Reich N E Gastric Diverticula Am J Dig D 94 8 70

In a series of 19,022 gastric examinations 6 cases (0.03 per cent) of gastric diverticula were found. These cases are reported with 2 additional cases from private practice. These diverticula are all located near the posterior wall of the cardia, the lesser curvature, which is the most common location of this lesion. The patients ranged from thirty-six to seventy-one years. The fact that gastric diverticula appear in the human embryo suggests that their presence in the adult may frequently be due to a persistence of the fetal diverticulum. There is apparently a local predisposition since the cardia and duodenum occur when the layer of longitudinal muscle fibers divides into two fascicles. Here the mesocolon is covered only by circular fibers.

The author classifies gastric diverticula into congenital and acquired and false types. He does not believe pulsion type exists. The false type is represented by the benign fistula or efferent ally that of the mucosa with a defective muscular coat due to ulcer or cancer. Acquired diverticula are found in about one third of all cases of gastric diverticula. The numerous complications associated with diverticulum of the colon do not affect the stomach probably because of the good blood supply to the caecum and abdominal causes of the mobility of activity of the stomach and its relation to the fecal matter.

and is a basis for favoring resection following perforation. In addition, the patients do not become symptom-free after the palliative operation. A second operation at a later date is much more dangerous because of adhesions and because the patient's condition may be worse. The average duration of hospitalization was three and one-half weeks, and 19.6 per cent of the patients had post-operative complications such as lung inflammation, bronchitis, and circulatory failure. There were 2 incisional abscesses and 1 femoral thrombosis and embolus of the lungs.

Before any conclusions may be drawn it is necessary to contrast the mortality of both types of surgical intervention and to evaluate the mortality and results obtained by resection. The use of gastric resection in the therapy of perforated gastroduodenal ulcers has definitely not elevated the gross mortality and has certainly reduced it. Peters, for example, has in the past three years performed gastric resection in 85 per cent of his patients. Prior to 1929 his mortality was 80 per cent, this has been reduced to 7.6 per cent in 100 cases of perforation. In addition, permanent end-results have been much more satisfactory.

The original article contained tables on the mortality found at the different time intervals when resection was done. From the reports of the other surgeons discussing the subject a total mortality of 18.1 per cent was given for patients who were in good general condition and had a satisfactory circulation at the time of operation. One may therefore conclude that gastric resection following perforation is the method of choice because of the lower total mortality. That this mortality may be very low has been demonstrated by Yudin in 673 cases of perforation which were resected. He reported a mortality of 0.8 per cent, and in the last 121 cases it dropped to 6.6 per cent. The Frankfurt Clinic also reports good end-results. They had in all their patients a gross mortality of 22.5 per cent. The mortality for the group having had gastric resection for perforation was 6.7 per cent.

The final conclusion is that in properly selected cases of perforation resection is the operation of choice.

STUART J. FOGELSON, M.D.

Petri, S., and Jensenius, H. Experimental Studies on the Production of Pernicious Anemia by Operation on the Digestive Tract. I. Survey of the Results of Total Gastrectomy and Resections of the Stomach. *Acta ned Scand*, 1941, 84: 274.

After an extended series of experiments aimed at the possible production of pernicious anemia in dogs, swine, monkeys, and rats subjected to total gastrectomy or subtotal resection of the stomach, the chief results obtained were only various anemic states which depended on the animal species and the type of operative procedure. In none of the many experiments was pernicious anemia successfully reproduced. None of the animals showed simultaneous

appearance of the typical characteristics: hyperchromic megalocytic anemia, hyperplasia of the bone marrow, and capacity for reaction to liver therapy.

In a few instances there appeared a blood picture somewhat resembling that of pernicious anemia. In gastrectomized pigs, however, there appeared constantly a severe, chronic pellagra which took a fatal course.

In the dog spontaneous anemia resulted in 78 per cent of the animals following total gastrectomy, in 59 per cent after subtotal gastrectomy or gastric resection, and in only 27 per cent after isolation of the stomach. In contrast to this, a state of anemia developed in 100 per cent of the dogs after resection of the fundus or pylorus. In the monkey only hypochromic anemia was observed. All animals seem to develop anemia more rapidly after total gastrectomy and fundus resection than after resection of two thirds of the stomach. JOHN W. NUTTER, M.D.

De Garis, C. F. Topography and Development of the Cecum-Appendix. *Ann Surg*, 1941, 113: 540.

The appendix is frequently one of the mobile viscera of the abdomen. Its position depends largely on the cecum which varies in contour and position. These changes in the cecum are dependent on the type of cecum, as well as the peristaltic activity, the state of filling, and other physiological conditions at any given time.

Three general types of ceca occur:

1. Type A, with the infantile contour, in which the cecum is a pyramid with the appendix arising from the inverted apex.

2. Type B, found most frequently in the early years of childhood. There is a symmetrical growth-distention of the right and left sides with the appendix attached to the most dependent part of the cecum.

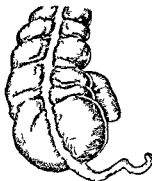
3. Type C, the usual adult form of cecum, in which there is a differential growth-distention in favor of the right ventral aspect of the cecum to such degree as to cause the appendix to arise distinctly to the left and dorsally. With excessive growth of the right wall of the cecum, the root of the appendix may lie close to, or even somewhat behind, the ileocecal junction.

The three types suggest a sequence of development from Type A through Type B to Type C, dependent upon weight bearing and "growth-distention" of the cecum. The author advances the following hypothesis:

In the newborn the Type A cecum-appendix takes a position in the right iliac fossa. As the child assumes the upright posture, the weight-bearing function becomes increasingly important in shaping the cecum. Linear and lateral growth of the cecum as well as of the remainder of the gastro-intestinal tract occurs. Thus Type B is the result of weight-bearing and intrinsic growth. As weight-bearing and growth continue, a differential is set up in favor of the right wall of the cecum by reason of the ileocecal junction and by the blood supply of the appen-



A



B



C

Fig. 1. A The undescended cecum (Type A) B The undescended cecum (Type B) C The undescended cecum (Type C) All three types are seen in the adult cecum appendix which the appendix arises distally

and to the left a res it fig with-d at pt of the right v tral wall of the cecum All the cecum a ened fr m fr t (Ca lesy f J B lapp ott C)

dx both forming a drag or fixation for the left wall. This differential appears to operate largely as the result of weight bearing and once set up readily extended to produce the definitive Type C of the adult cecum appendix.

The fact that in the undescended cecum the contour remains either as Type A or B apparently because the usual weight bearing of fecal contents is not a factor in shaping the contour would seem to support the hypothesis.

The positions of the appendix may be classified into two categories:

1. The adherent retroposition (behind the colon cecum or ileum)
2. The postcecal or other use directed position of the fully mobil appendix.

The descent of the colon from the liver to the iliac region is often attended in transit by a folding under of the appendix which latter forms an inclusion behind the colon. If the appendix remains free and directed caudally during its descent it may have great mobility provided pathological changes do not alter the situation. The variability in position of the appendix suggests the futility of giving McBurney point a precise topographic definition rather we should endeavor to find the point of greatest tenderness in appendicitis.

JOHN A. G. S. M.D.

Mason M. L. Allen H. S. Queen F. B. and Gibbs E. W. A. Re. i. w. f. 1000 Consecutive Appendectomy Operations. J. B. L. V. Th. et. Un. Med. Sch. of 94. 5. 1.

This review is based on the records of 1000 consecutive patients who were operated upon primarily for appendicitis of some degree over a ten year period at Passavant Memorial Hospital Chicago. The mortality rate for all cases was 3 per cent. The cases were classified according to the pathological diagnosis supplemented by the surgeon's observations regarding the presence of peritonitis, abscess formation or other findings which the

pathologist could not evaluate from a study of macroscopic sections alone.

The following groups form the basis for this classification: acute appendicitis, chronic appendicitis, fibrosis of the appendix, normal appendix, multiple ulcers of the appendix and mucocele. The diagnosis of appendicitis. Complications and fatalities were most common among the cases of acute appendicitis with peritonitis or abscess formation and in cases in which appendectomy was performed in the presence of other pathological processes found at operation to be the probable cause for the symptoms manifested.

There were 656 cases of acute appendicitis. 138 of these the appendix was unperforated, in 15 there was perforation without peritonitis or abscess formation, in 40 there was peritonitis and in 19 there was abscess formation. The mortality rate for all cases of acute appendicitis was 1.5 per cent. For the unperforated group the mortality was 3 per cent with early perforation this figure rose to 6.7 per cent with peritonitis to 10 per cent and with abscess formation to 10.5 per cent.

Immediate operation is indicated in all cases of unperforated acute appendicitis or where the appendix is reasonably suspected to be the cause of acute abdominal symptoms and cannot be ruled out. Immediate operation is indicated in all cases of appendicitis with peritonitis regardless of the time seen except in the obviously moribund patient or the patient whose general condition precludes any operative intervention whatever. Conservative management seems justified only in that group of patients with appendiceal abscess or a definitely localized mass. If the response to treatment drainage is indicated.

The age, sex and seasonal incidence are discussed and the relative frequency of the common clinical manifestations in each type of appendicitis are analyzed in detail. The authors attach considerable importance to a group of symptoms which they classify as abdominal consciousness. When histories

are carefully taken it is often apparent that the patient with acute appendicitis has been aware of vague abdominal symptoms for one or two days before the onset of an acute attack. These symptoms are ordinarily forgotten or disregarded. The appetite may be diminished, there may be a mild feeling of fullness, and movements of gas, ordinarily ignored, may become perceptible. These symptoms are thought to mark the occurrence of minor changes in the appendix which precede the acute inflammatory process that produces grossly recognizable complaints. These minor pathological changes unaccompanied by striking symptoms may, in part explain the unreliability of chronological criteria for determining the degree of appendiceal involvement.

The "classical" symptoms and signs of acute appendicitis are present in but a third of the patients. Pain was the most consistently observed symptom, not only in patients with acute appendicitis but also in those with chronic inflammation, fibrosis or a normal appendix. Leucocytosis and fever were seen to depend in the main upon the degree of appendiceal involvement. However, an elevated white-cell count and a fever are not infrequently absent even in cases in which a markedly inflamed appendix is removed. Nausea and vomiting are slightly more common among patients with acute appendicitis than among those with chronic fibrosed or normal appendices. Abdominal tenderness is the most consistently demonstrable clinical finding in patients with acute appendicitis, but was also observed in a large number of patients with lesser degrees of appendiceal involvement. Involuntary abdominal rigidity, while not a consistent finding, was elicited in five times as many patients with acute appendicitis as with chronic appendicitis, fibrosis of the appendix, or normal appendix. It should be added that rigidity seems to be more frequently found by the experienced surgeon than by the less experienced one. Microscopic hematuria and pyuria are often seen in cases of acute appendicitis when the appendix is in a retrocecal position.

The McBurney incision was associated with a lower mortality rate and fewer postoperative complications than the right rectus incision. The advantages of the McBurney incision for acute appendicitis far outweigh any possible disadvantages, including the rare instances in which it is necessary to enlarge this incision or to close it and make a second more advantageous incision.

Of particular interest to the thoughtful surgeon is the relation of pre-operative skin preparation to postoperative wound infections in all undrained cases of acute unperforated appendicitis. Gentle thorough soap and water cleansing of the abdominal skin was associated with fewer postoperative wound infections than attempts at sterilization of the skin with tincture of iodine, picric acid, or alcohol.

The authors believe that intraperitoneal drainage is indicated only when there is gross and foul-smelling exudate in the peritoneal cavity. The mortality rate in cases of peritonitis which were not drained

was slightly lower than in drained cases, but the number of cases reported is admittedly too small to permit dogmatic conclusions.

The clinical manifestations and course of patients who were found to have chronic appendicitis, fibrosis of the appendix, or a normal appendix are discussed. There were no deaths among 52 cases of chronic appendicitis and 186 cases of normal appendix. There was 1 death in 76 cases of fibrosis of the appendix.

There were 9 cases of miscellaneous diseases of the appendix and 21 cases in which some other pathological process was found, at operation to be the cause for the symptoms manifested.

EDWARD W. GIBBS, M.D.

Rose, T. F. Retroposition of the Transverse Colon Complicated by Ileocecal Volvulus. A Report of 1 Case with Recovery, and a Review of the Literature. *Med J Australia*, 1941, 1: 225.

Retroposition of the transverse colon is a congenital condition in which the transverse colon lies behind the superior mesenteric vessels, and the third part of the duodenum is in front of them. In addition it may be accompanied by abnormalities of the third stage of midgut rotation. This is apparently the rarest anomaly of the second stage of bowel rotation.

The important predisposing factor of ileocecal volvulus in such cases is the retention of the primitive mesentery of the cecum, ascending colon, and hepatic flexure. The anomalous position of the transverse colon *per se* need not give rise to any sequelæ.

The case reported is that of a forty-three-year-old man with a three-day history of severe abdominal pain. The pain began in the left iliac fossa, radiated over the lower abdomen, and was colicky in nature. With each spasm of pain, distention of the abdomen occurred. There was no vomiting. No previous similar attack had occurred. The temperature and pulse rate were normal. On examination, the abdomen was distended and tender, especially in the right lower quadrant.

At laparotomy, it was found that the obstruction was caused by volvulus of the terminal ileum, cecum, ascending colon, and that portion of the transverse colon which lies to the right of the mesentery of the small bowel. Distal to the volvulus, the transverse colon disappeared through a tunnel in the mesentery of the small bowel behind the superior mesenteric vessels. The involved portion was greatly distended and of tissue-paper thinness, but was still viable. The volvulus was carefully untwisted and a cecostomy performed with a catheter. This was done to drain the distended small intestine and to form adhesions so that the cecum would become fixed to the iliac fossa and prevent recurrence of the volvulus. The tube was removed on the eighth postoperative day and complete recovery followed.

There were 11 other cases in the literature, 7 in females and 4 in males. The ages ranged from seven

days to sixty eight years. There were no diagnostic symptoms or radiological signs indicative of retroposition of the colon. It was only with the onset of volvulus that the symptoms of obstruction appeared. The type of operation depended upon the viability of the bowel. Resection must be done if the bowel is non viable. HAROLD LAUFMAN MD

Gabriel W B. Squamous Cell Carcinoma of the Anus and Anal Canal. An Analysis of 55 Cases. *Proc Roy Soc Med Lond* 1941 34 139

Gabriel presents an analysis of the cases of 55 patients with squamous-cell carcinoma of the anus and anal canal who were admitted to St Marks Hospital during the period from 1922 to 1940. The incidence was 3.35 per cent of all cases of carcinoma of the rectum, anal canal and anus. The distribution was equally divided between men and women and the average age of the patients was sixty one and seven tenths years, which is somewhat higher than that in columnar-cell carcinoma. The cases were graded into three grades of malignancy—low, medium and high. Low grade squamous carcinoma is twice as frequent in men as in women and generally originates at the anal margin. Medium grade squamous carcinoma is equally distributed between the sexes and it may arise at the anus or in the anal canal. High grade lesions are much more common in women and are almost entirely limited to the anal canal. One third of the anal margin growths and one half of the anal canal growths were situated anteriorly. Differential diagnosis must be made from simple papilloma, simple ulcer, chronic inflammation, tuberculous ulcer, primary chancre, amebic ulcer, basal cell carcinoma and columnar carcinoma.

The results of treatment in the three grades of malignancy are described. The best results were obtained in the early low grade cases treated by interstitial radium needling. In the medium and high grade cases only 3 five year survivals can be reported and these followed excision of the rectum.

The necessity for gland dissection of the groin must be determined on a clinical basis. If the glands are enlarged to about 0.5 in in diameter or more, if they are hard rather than firm or soft metastases are probably present and block dissection of one or both groins should be done according to indications. In the author's opinion there is time for gland dissection (if there is immediate indication for this) from two to three weeks after the treatment of the primary growth has been carried out.

Gabriel is opposed to the local removal of a gland for diagnostic purposes if the glandular involvement is such as to arouse the suspicion of malignancy; the only sound treatment is a formal gland dissection. If no glands are palpable in the inguinal regions or if they are only small clinically simple glands are present and the groins should be watched. The author emphasizes the importance of this supervision for at least two and one half years after operation with personal follow up. J M MORA MD

LIVER, GALL BLADDER, PANCREAS AND SPLEEN

Richards R K and Appel M Th. Barbiturates and the Liver. *Am J Pathol* 1941 2 64

In addition to a review of the more recent work regarding the relationship of the barbiturates to the liver, the authors present experimental data obtained with mice, rabbits, dogs and monkeys. The problems discussed are not settled.

Although anatomical changes in the liver after the use of barbiturates have been described and occasional clinical observations support the suggestion that liver damage may occur, barbiturates can not be considered clinically as specific liver poisons even after repeated use. Transitory fatty infiltration of the liver that can be partially inhibited by adequate preliminary treatment with dextrose has been observed with many barbiturates. Thiobarbiturates should not according to present knowledge be used orally for chronic administration. When these drugs are used intravenously to produce anesthesia the danger of producing liver damage seems to be very slight. Barbiturates do not seem to impair metabolic activities of the liver but the available data do not permit a definite statement as regards their possible effect on a diseased liver in which function is impaired or the ability to cope with these drugs is decreased.

Experiments of the writers support other studies which state that experimental liver damage does not influence the action of the long acting barbiturates such as barbital but does cause a marked prolongation of the effect of the shorter acting groups such as nembutal. Support is also furnished by observations indicating that the liver does not play the same role in the inactivation of pentothal as it does with the other short acting preparations. Mild liver damage due to fatty infiltration arising from dietary deficiency causes a tendency to prolong the action of all types of barbiturates; this is possibly due to impairment of the liver function or perhaps to retarded removal of the drug which has been absorbed into the liver fat.

WALTER H. NALER MD

Lucia S P and Aggel R P M. The Influence of Liver Damage on the Plasma Prothrombin Concentration and the Response to Vitamin K. *Am J Med Sci* 1941 2 325

The relationship between the prothrombin concentration and liver function as determined by the hippuric acid test was studied in 92 patients, 23 of whom had obstructive jaundice, 43 of cases of the liver and 26 with non renal disease. In addition the values for the prothrombin concentration and hippuric acid tests were determined after treatment with Vitamin K in 51 patients, 11 of whom had obstructive jaundice, 12 of cases of the liver and 28 with non renal disease. No significant correlation was found between the results of the liver function test and the plasma

prothrombin concentration either before or after the administration of Vitamin K. Prothrombin concentration may be normal in patients who have severe impairment of liver function as measured by the hippuric-acid test. Plasma prothrombin concentration may become normal after the administration of Vitamin K even though the liver function remains severely impaired. Failure of recovery from hypoprothrombinemia cannot be correlated with the degree of impaired hepatic function.

Regardless of the results of function tests, the authors found that in the presence of acute liver disease the fluctuations in the prothrombin concentration are conditioned by the severity of the illness and are not ordinarily influenced by Vitamin K. In chronic, diffuse liver disease there may be a low prothrombin concentration, which is not usually influenced by Vitamin K. In obstructive jaundice there may be a low prothrombin concentration which usually can be significantly elevated with Vitamin K unless severe hepatic damage is also present.

WALTER H. NADLER, M.D.

Zollinger, R. Acute Cholecystitis. *New England J. Med.*, 1941, 224: 533.

In the past, the treatment of acute cholecystitis generally included delay of operation until the acute signs and symptoms of the disease had subsided. Over a period of twenty years, 235 cases of acute cholecystitis were treated according to the above dictum in the Peter Bent Brigham hospital in Boston, with a mortality rate of 10.7 per cent.

Since that time, it was decided to follow the diagnosis of acute cholecystitis by immediate hospitalization. Pain is relieved, fluid balance established, and signs, symptoms, and laboratory data are evaluated frequently. The optimum time for operation depends on the patient's response to pre-operative treatment. Signs of progression of the inflammatory process in the right upper quadrant, or of general peritoneal irritation indicate early operation. Each patient is an individual surgical problem, and stereotyped management is unsatisfactory.

In 121 cases of acute cholecystitis treated by operation during the last five years according to the above plan, a mortality rate of 3.8 per cent was obtained.

These patients ranged all the way from those whose acute signs and symptoms had already subsided by the time of admission to those with a fulminating infection whose acute signs and symptoms increased in severity under conservative treatment. Such patients must be observed early and frequently in order that the most suitable time for operation can be chosen.

Twenty-five per cent of the patients in the series were operated on within forty-eight hours of admission to the hospital, whereas the remaining 75 per cent were hospitalized seventy-two or more hours before operation.

Perforation, which increases the mortality, occurred in 16, or 13 per cent, of the 121 cases, with a

mortality of 6 per cent. Except in rare cases, the perforation is walled off by the omentum and adjacent tissue, and an extracholecystic abscess is formed. As a rule, persistent pain, increasing leucocytosis, and increasing local signs of inflammation under treatment imply that the gall bladder has perforated.

Postoperative complications were present in 20 per cent of the entire group; they were mostly pulmonary, wound infection being the second most frequent. Infection and pulmonary embolus were the chief causes of death. Advanced age was not considered a contraindication to surgery.

Cholecystectomy was performed in 71 cases, with a mortality rate of a little over 1 per cent, which is only a fraction higher than that for chronic cholecystitis. Choledochostomy was combined with cholecystectomy in 40 cases, with a mortality rate of 5 per cent. Common-duct stones were found in 20 cases, an incidence of 15 per cent, which is almost as high as that in cases of chronic inflammation. Choledochostomy was carried out only in the severest cases, with a mortality rate of 11 per cent. This is always followed later by cholecystectomy, except in patients who are very poor risks.

Although improvements in postoperative care must receive credit for reducing the mortality, individualization of the treatment of the patient with acute cholecystitis is probably the most important factor.

S. LLOYD TEITELMAN, M.D.

Martensson, K. Studies on the Etiology of Gall Stones. *Acta chirurg. Scand.*, 1941, 84: Supp. 62.

The current study on the etiology of gall stones is a sequel to the one published in 1937 entitled "The Incidence of Gallstones in Sweden. The Correlation of Gallstones with Various Diseases and Pathologic Changes." The present work consists partly of patho-anatomical, bacteriological, and chemical investigations on human material and partly of experiments *in vivo* and on animals.

A general survey on the composition of gall stones leads to the conclusion that gall stones can be classified as to the preponderance of structural elements such as pure pigment, cholesterol, calcium, and mixtures of these elements. Further study of the morphology would indicate that gall stones are made up of an organic stroma that holds the "stone elements" together. Attention is called to "cholesterinization" as described by Naunyn, Rosving, and Boysen. It would appear that many of the large stones begin as a pigment nucleus and as time lapses cholesterol is deposited.

A study of normal bile for sediment revealed no epithelial cells or structure resembling the latter and the conclusion reached is, "The epithelial cells proven to exist in the gallstones' centers therefore seems to indicate the existence of a pathologic process with epithelial desquamation during the first step of stone formation." An investigation of quantitative cholesterol and calcium determination of gall stones indicated that the relative as well as

the absolute quantity of cholesterol increases parallel with the gain in weight of the stones and that a cholesterinization in the chemical sense may take place in gall stones during their stay in the gall bladder

An investigation of the stroma of gall stones revealed that it consisted almost entirely of solid rod shaped structures joined together into long thread and bundles and forming a veritable network. In the periphery these rods are gram positive and often contain endospores. In the central areas the rods become gram negative. These rods are termed the typical bacilli. The conclusion is that all human gall stones have an organic stroma which at least in some cases is built up of formations resembling the tissue in the mucous membrane of the gall bladder and the so called typical bacilli.

A study of the symptomatology and pathology of the disorder of gall stones leads to the conclusion that in the largest percentage of cases the formation of biliary calculi proceeds without any symptoms of biliary disorder the so called silent course and that in most cases the cholecystitis if present is secondary to the gall stones. A study of the pathology of the liver, gall bladder and biliary passages in the presence of gall stones shows little of significance relative to the etiology of gall stones. It is noted that in some geographic areas such as Batavia gall stones are rarely if ever encountered however if an inhabitant of such a geographic zone is transported to a region where gall stones are prevalent such an individual will demonstrate a higher morbidity than the original inhabitant. It is deduced therefore that an environmental factor seems to play a part in the formation of biliary calculi. It was also noted that a chronic duodenogastric reflux into the mucosa of the gall bladder was found in practically all uncomplicated cases of gall stones.

The various theories of the etiology of gall stones were studied and investigated by clinical and experimental studies and the final conclusion reached that dietary disturbances hypercholesterolemia status or disturbances in motility of the biliary tract and attenuated or virulent infection do not play a role. Likewise general disturbances such as pneumonia, adiposity, pancreatic lipomatosis, adrenal lipoidosis, diabetes mellitus, hepatic monodermis, chronic and healed tuberculosis, pernicious anemia, splenic and hepatic stasis and testicular fibrosis were considered and discarded as etiological factors in the formation of gall stones.

An investigation was made of the bacterial content of bile, calculi and feces in 78 cases of gall stones and of the bile and feces of cases with calculi. These resulted in the finding of gram positive motile endoparasitic rods in the first group which were called typical bacilli and other commonly encountered gram stains such as the bacillus coli and paracoli, taphylococcus albus, streptococcus like diplococcus bacilli, which and others. In 19 of the 78 cases both the calculi and the bile

were sterile. The typical bacilli were found in 33 or 42 per cent and these were the only bacteria in 17 cases or 21.8 per cent. Thin slices of pigment cholesterol gall stones aseptically cut were placed on 5% Magnus plates incubated at plus 37°C and examined at intervals by means of agar microscopy according to Orskov. In several cases this yielded a growth of typical bacilli and occasionally the bacillus coli and cocci.

A study of the morphology and certain biological qualities of the typical bacillus shows that this organism does not fit into any of the bacterial groups described in text books. Two groups were identified. Type I a facultative anaerobe and Type II an obligatory anaerobe. Type I is a straight or slightly curved rod with round ends that has a tendency to grow into long threads. It is actively motile. Spores appear within from twenty-four to forty-eight hours in agar culture. It hemolyzes human and rabbit blood. Type II grows only anaerobically and shows a scanty thread formation otherwise it is essentially the same as Type I.

In experiments with fixation of the complement antigen extracts of some gall stones gave fixation of complement with antiserum against typical bacilli also the intracutaneous injection of 0.1 cc. of a clear antigen extract of typical bacilli gave an allergic reaction in several patients with gall stones.

Direct inoculation of typical bacilli into the gall bladders of 73 rabbits was followed by the formation of definite gall stones or preliminary forms in 55 cases. Formed bodies appeared within twenty-four hours from bodies as a rule in one week and stone hard grossly stratified bodies as a rule in about three months. Gall stones were produced experimentally also in swine, sheep and cattle following the inoculation of typical bacilli. The stones varied in size up to 1 cm. in diameter and all the types of gall stones seen in man were obtained. The typical bacilli were obtained in pure cultures from such experimentally produced stones. Rabbits that were immunized and then inoculated with typical bacilli in doses sufficient to produce gall stones did not develop calculi from five to six months.

No matter in which way the inoculation of typical bacilli was done it was always followed by a proteolytic desquamation of mucosal processes similar to that observed in the 2 cases previously mentioned of probably recent gall stone formation in man. As a rule the process was accompanied by a mild inflammatory reaction in the form of hyperemia and edema in the submucosa and in some cases the tunica fibrosa also but there was generally a very scanty or no round cell infiltration whatever. At the same time there could be observed shifts in the pH of the bile a reduction in the bile salt content and finally precipitation of pigment compounds and cholesterol as well as of inorganic calcium on the network of desquamated mucosal tissue and bacilli which later constituted the stroma of the stone. These preliminary formations of calculi later increased in size and became stratified and then hardened at the

SURGERY OF THE ABDOMEN

same time as reparative processes begin in the gall-bladder wall, so that the latter eventually becomes practically normal or else shows only mucosal atrophy or hypertrophy, possibly accompanied by a slight increase in connective tissue in the submucosa and perhaps in the tunica fibrosa also. At the same time, the bile returns to its normal color and viscosity and becomes quite clear with a normal pH and a higher bile-salt content. We thus have the picture usually presented by uncomplicated cases of gall-stone disease in man. Relapses may occur later, with the formation of new stones or increase in size of the old ones. On these occasions the typical bacilli can generally be demonstrated in the bile.

The evidence leads to the conclusion that an infection of the gall bladder with typical bacilli is not the only conceivable etiological factor in the formation of gall stones in man, and that certain mulberry stones may be formed because of the polypi in gall bladders in cholesterosis which store cholesterol until they become stone-hard, and then loosen from the wall, thus taking place independently of the typical bacilli.

JOHN A. WOLFER, M.D.

Ogilvie, R. F. Duodenal Diverticula and Their Complications—Acute Pancreatic Necrosis. *Brit J Surg*, 1941, 28, 362

The author describes the clinical histories and post-mortem findings of 4 cases of perivaterine duodenal diverticula. In Case 1 the diverticulum produced obstruction and dilatation of both the pancreatic and common bile ducts, with resultant atrophy of the pancreas and death from obstructive jaundice. In each of Cases 2, 3, and 4 the diverticulum was associated with acute pancreatic necrosis, which favored the view that this disease of the pancreas is obstructive in origin.

In a review of the literature, cases are cited which illustrate the complications of duodenal diverticula. Although primary diverticula of the duodenum are relatively common, complications are rare. They are classified as obstruction, which may be that of the duodenum, of the common bile duct or of the pancreatic duct, diverticulitis, which may be followed by perforation, peridiverticulitis, duodenitis, or cholangitis, calculi, which may be either enteroliths or gall stones, and carcinoma.

The association of a perivaterine diverticulum and acute pancreatic necrosis has been reported several times. All the phenomena of acute pancreatic necrosis are explicable on the grounds of an escape of pancreatic juice from the ducts into the surrounding tissues. Such an escape of pancreatic juice can occur only through destruction or rupture of the ducts or acini. This may be brought about by external trauma, focal infarction of the organ, infection with tissue destruction, retrojection of bile into the pancreatic duct with rupture of the acini, or pressure due to obstruction of the ducts from outside the pancreas or within its substance.

Most authors maintain that in the majority of cases pancreatic necrosis results from obstruction

of the duct system of the pancreas. In some cases, this obstruction occurs in relation to the main duct and is due to a duodenal diverticulum, pancreatic calculus, or stone in the lower end of the common bile duct, but in most instances the obstruction is found in tributaries of the duct within the pancreas, and takes the form of a proliferative and transitional metaplasia of the lining epithelium. However, duct obstruction does not invariably provoke pancreatic necrosis, and such exceptions are probably due to inactivity of the secretory glands of the pancreas.

Duodenal diverticula are relatively immune to infection, probably because their contents are sterile, they are situated retroperitoneally, which permits ready distention, they have an inverted position and wide-mouthed ostia which allows free drainage into the bowel. However, once filled, they may not readily empty themselves and stagnation of their contents favors bacterial growth, infection of the wall, and diverticulitis.

The reasons for the rarity of calculus formation in these pouches are probably similar to those which prevent the occurrence of diverticulitis.

Only 1 case has been reported in which malignancy occurred in association with the duodenal diverticulum.

S. LLOYD TEITELMAN, M.D.

Kennard, H. E. Papillary Cystadenocarcinoma of the Pancreas. *Surgery*, 1941, 9, 65

Malignant degeneration of cysts of the pancreas is very rare, while papillary cystadenocarcinoma of the pancreas is probably exceedingly rare. Kennard reports a case of a female patient, forty years old, who for three or four years had noticed a swelling of the lower abdomen. Exploration revealed a large cystic mass which arose from the middle of the pancreas as a sessile tumor. The tumor was developed. A dissection was made through the tumor, the transverse mesocolon, and the gastrocolic omentum, and the tumor was removed and a defect about the size of a fifty-cent piece was left in the midportion and inferior margin of the pancreas. Histological examination revealed the tumor to be a papillary cystadenocarcinoma of the pancreas. The patient made an uneventful recovery and showed no evidence of recurrent malignant disease ten months following the operation, however, she had a mild persistent diabetes, which had not been present before the surgical intervention.

The author has reviewed the literature on pancreatic cysts in general with special attention to those cases of probably malignant cysts, of which he has found 25 in the literature. The ages of the patients varied from thirty-four to seventy-nine years; sex distribution was not significant. In most of the cases the symptoms were either abdominal pain or abdominal swelling of long standing in most instances, while only rarely was there rapid growth. The operative procedures varied from exploratory laparotomy and closure to drainage, marsupialization, and excisions. The operative mortality in the re-

ported cases was quite high although if the patient recovered from operation they lived a considerable length of time. Two of them lived seven years after which one died of a proved malignancy and the other developed a malignant cystadenocarcinoma which was excised. Only 1 other patient had a definite glycosuria.

The author does not state his opinion as to whether the malignancy was secondary to the cyst or whether it was primary. The relative incidence of malignant to benign pancreatic cysts is according to Kennard about 9 per cent. He believes that the only adequate treatment is complete excision of the tumor.

WILLIAM C. BECK, M.D.

MISCELLANEOUS

Ruggieri E. Abdominal Plethra in the Pathogenesis of the Acute Abdominal Syndrome of Pleuropulmonary Disease. (La pletoria addominale nella patogenesi delle sindromi del mal acuto da pleuropneumonia). *Chirurgia* 1946, 6: 637.

The author has studied experimentally the complex clinical problem of the acute pleurosurgeal syndrome in pleuropulmonary disease. He reviews the various theories that have been offered in explanation of this well known clinical phenomenon. The most recognized of these explanations is the neurogenic theory that abdominal pain is due to irritation of certain nerve trunks such as the intercostal, the phrenic, the vagus and the ileohypogastric.

The author points out some discrepancies in this theory, namely that the acute abdominal syndrome appears in chest conditions when none of these nerves can possibly be involved (parietal or mediastinal pleura) and states that if an inflammatory reaction in the nerve trunks is assumed, the sudden relief of these symptoms after a thoracentesis or a paracentesis would seem contradictory since it takes time for nerve tissue to heal and regenerate. The occurrence of a similar syndrome in cardiovascular diseases has led him to an interest in circulatory changes as a possible explanation of this syndrome.

Post mortem studies on patients with acute chest conditions furnished the following data in circulatory pneumonia: 55 per cent of the cases in bronchopneumonia, 66 per cent in bronchopneumonia complicating pulmonary emphysema, 100 per cent in spontaneous pneumothorax from pul-

monary tuberculosis, 80 per cent showed hyperemia of the liver and spleen. The author concludes that there is a hyperemia of the liver and spleen in many acute conditions of the respiratory apparatus. He suggests that the abdominal hyperemia may be correlated with the reduction in the respiratory area of the lung. In fact, he points out that in those conditions such as bronchopneumonia and spontaneous pneumothorax in which there is a marked reduction in the pulmonary area, there is an incidence of hyperemia in the liver and spleen amounting to from 80 to 100 per cent.

The author then studied the question experimentally in two series of animals. In a group of 8 rabbits he induced pneumothorax by various methods and then examined the abdominal organs macroscopically and microscopically. In this series the liver was markedly hyperemic. The portal vessels, the centrilobular veins and the intralobular capillaries were markedly dilated. These changes were found throughout the liver parenchyma. The spleen showed dilatation of the veins and the centrilobular arteries. There was also dilatation of the lacunar vessels of the reticulum. Subcapsular hyperemia was particularly apparent in the spleen. There was also marked hyperemia of the kidneys, especially in the vessels about the tubules.

In a series of 5 dogs the author attempted to determine what happened to the pressure in the inferior vena cava when a large area of the pulmonary tissue was involved. Under ether anesthesia a laparotomy was made and the inferior vena cava was connected with a glass cannula to a manometer. Three of these dogs died of hemorrhage. In the 2 others it was observed that opening of the pleural cavity resulted in dilatation of the inferior vena cava and an increase in the manometric reading. The liver, kidneys and spleen showed the same hyperemic changes as were noted in the previous experiments on rabbits.

The author concludes that the theory of neurogenic irritation is not an adequate explanation of the pathogenesis of the abdominal syndrome in acute pleuropulmonary disease. Post mortem and experimental studies have indicated that in acute conditions of the respiratory tract there are circulatory changes of a mechanical nature in the splanchnic area with a result, greatest in the inferior vena cava and intensification in the hepatoportal region. The latter changes are the cause of the abdominal syndrome in pleuropulmonary disease.

J. CO. E. KLEIN, M.D.

GYNECOLOGY

ADNEXAL AND PERIUTERINE CONDITIONS

Strassmann, E. O. The Theca Cone and Its Tropism Toward the Ovarian Surface, a Typical Feature of Growing Human and Mammalian Follicles, *Am J Obst & Gynec*, 1941, 41: 363

This article is a report of microscopic work done over a period of eighteen years. It presents the "theca interna cone" and its tropism toward the ovarian surface as a new feature in the normal histology and physiology of the ovary. The theca interna cone functions as a pathmaker for the ascent of the growing follicle to the ovarian surface. It is, therefore, an integral part of the mechanism of ovulation.

The findings are based upon more than 18,000 microscopic serial sections of ovaries in four mammalian orders: primates (man), carnivora (dog, cat), rodentia (rabbit), and ungulata (horse, cow, swine), and they are illustrated by photomicrographs showing small, medium, and large follicles of various species.

The diameter of human growing follicles and their distance from the ovarian surface were measured micrometrically. Corresponding to the size, five groups of follicles were formed, and the average distance of each group from the ovarian surface was calculated. It was shown that in the early stages of follicular growth, up to a diameter of 0.25 mm, there was a descent of the follicles from the albuginea toward the hilus, and an ascent of the larger follicles back to the surface. This ascensus began with the appearance of the theca layers.

Examination of the theca layers in serial sections showed that their growth was an eccentric one. There was present a one-sided thickness of the theca interna, rich in cells, toward the ovarian surface, which in large follicles was from eight to ten times wider at the upper pole than at the lower pole toward the hilus. The theca externa, on the other hand, rich in connective-tissue fibers, was wide around the lower hemisphere of the follicle and thin at the upper hemisphere toward the ovarian surface. Thus, the theca externa, like a goblet, kept the follicle from expanding to any other side except to the surface of the ovary.

In serial sections cut perpendicularly to the ovarian surface, it was found that there was not only a one-sided blunt thickness of the theca interna, but a wedge-like "theca interna cone" with a triangular cut surface which always pointed to the nearest part of the ovarian surface. This theca cone possessed a tropism toward the surface like the sprout of a seed and plowed the path for the follicle by active infiltrating growth through the stroma and albuginea. The follicle proper followed the line of least resistance provided by the theca cone. The granulosa protruded into the cone, and frequently

adopted the shape of a cone itself, the axis of which always coincided with the axis of the theca cone.

The theca cone was found in all the mammalian species examined, including man. In all the mammalian species with a free ovarian surface, the theca cones grew divergently toward the next point of the ovarian surface. In horses, in which the ovaries were surrounded by connective tissue, the theca cones grew convergently toward the only free spot, the "ovulatory pit." This proved that the theca cone fulfilled the purpose of bringing the follicle to that part of the ovarian surface where ovulation can take place.

Geometrical considerations showed that the theca interna cone could be demonstrated as a triangular-shaped wedge only in serial sections which were cut perpendicularly to the ovarian surface and which ran through the apex of the cone. Sections cut in any other direction would never reveal the theca cone as a wedge-like formation. This must have been the reason that it was not found before in the ovary, an organ which has been studied by many research workers for several generations.

The theca interna cone was present in actually growing follicles only. It disappeared as soon as degeneration took place. It, therefore, can be used as a test for gonadotropic hormones. Rupture of the follicle was useful as a qualitative test but, if combined with hemorrhage, showed overdosage of the gonadotropic hormones. The theca interna cone can be useful as a quantitative test, as it shows the various degrees of stimulation before ovulation occurs. It, therefore, should become useful for determining the physiological dosage and timing.

EDWARD L. CORNELL, M.D.

Orsós, F. Obliterating Hematosalpinx (Haematosalpinx obliterans) *Zschr f d aerztl Fortbild*, 1940, 37: 551

A sixteen-year-old virgin was ill for four months with pain in the right lower quadrant of the abdomen, vomiting, and fever. She had been menstruating since her fifteenth year but had menstruated only twice, the last period having occurred a month ago. The gynecological examination revealed a fluctuating tumor the size of an ostrich egg which originated in the right adnexa. The uterus and adnexa could not be palpated separately. At the operation a bicornuate uterus was found and a thickly swollen, brownish red tube which lay in a coagulated mass of blood confined by the omentum. The tube and the right cornu of the uterus were removed, and uneventful recovery followed. The tortuous tube was filled with chocolate-brown, thick fluid. Histologically the tubal lumen was filled with blood clot consisting in greater part of desquamated and invaded cells, but which also contained unchanged red blood cells. The greater part of the cells were

ported cases was quite high although if the patients recovered from operation they lived a considerable length of time. Two of them lived seven years after which one died of a proved malignancy and the other developed a malignant cystadenocarcinoma which was excised. Only 1 other patient had a definite glycosuria.

The author does not state his opinion as to whether the malignancy was secondary to the cyst or whether it was primary. The relative incidence of malignant to benign pancreatic cyst is according to Kennard about 9 per cent. He believes that the only adequate treatment is complete excision of the tumor.

WILLIAM C. BICK, M.D.

MISCELLANEOUS

Ruggieri E. Abdominal Plethora in the Pathogenesis of the Acute Abdominal Syndrome of Pleuropulmonary Disease (La plethora addominale nella patogenesi delle sindromi addominali acute di pleuropneumopatie). *Chirurgia* 94: 10-637.

The author has studied experimentally the confusing clinical problem of the acute pseudosurgical syndrome in pleuropulmonary disease. He reviews the various theories that have been offered in explanation of this well known clinical phenomenon. The most recognized of these explanations is the neurogenic theory that abdominal pain is due to irritation of certain nerve trunks such as the intercostal, the phrenic, the vagus and the leiohypogastric.

The author points out some discrepancies in this theory, namely that the acute abdominal syndrome appears in chest conditions when none of these nerves can possibly be involved (parietal or mediastinal pleura) and states that if an inflammatory reaction in the nerve trunks is assumed the sudden relief of these symptoms after a thoracentesis or aspiration would seem contradictory since it takes time for nerve tissue to heal and regenerate. The occurrence of a similar syndrome in cardiovascular diseases has led him to an interest in circulatory changes as a possible explanation of this syndrome.

Post mortem studies on patients with acute chest conditions furnished the following data: in croupous pneumonia 55 per cent of the cases, in bronchopneumonia 66 per cent, in bronchopneumonia complicating pulmonary emphysema 100 per cent, and in spontaneous pneumothorax 75 per cent.

monary tuberculosis 80 per cent showed hyperemia of the liver and spleen. The author concludes that there is a hyperemia of the liver and spleen in many acute conditions of the respiratory apparatus. He suggests that the abdominal hyperemia may be correlated with the reduction in the respiratory area of the lung. In fact, he points out that in those conditions such as bronchopneumonia and spontaneous pneumothorax in which there is a marked reduction in the pulmonary area, there is an incidence of hyperemia in the liver and spleen amounting to from 80 to 100 per cent.

The author then studied the question experimentally in two series of animals. In a group of 8 rabbits he induced pneumothorax by various methods and then examined the abdominal organs macroscopically and microscopically. In this series the liver was markedly hyperemic. The portal vessel, the centrilobular veins, and the intralobular capillaries were markedly dilated. These changes were found throughout the liver parenchyma. The spleen showed dilatation of the veins and the centrilobular arteries. There was also dilatation of the lacunar vessels of the reticulum. Subcapsular hyperemia was particularly apparent in the spleen. There was also marked hyperemia of the kidneys, especially in the vessels about the tubules.

In a series of 5 dogs the author attempted to determine what happened to the pressure in the inferior vena cava when a large area of the pulmonary tissue was involved. Under ether anesthesia a laparotomy was done and the inferior vena cava was connected with a glass cannula to a manometer. Three of these dogs died of hemorrhage. In the 2 others it was observed that opening of the pleural cavity resulted in dilatation of the inferior vena cava and an increase in the manometric reading. The liver, kidneys, and spleen showed the same hyperemic changes as were noted in the previous experiments on rabbits.

The author concludes that the theory of neurogenic irritation is not an adequate explanation of the pathogenesis of the abdominal syndrome in acute pleuropulmonary disease. Post mortem and experimental studies have indicated that in acute affections of the respiratory tract there are circulatory changes, a mechanical retention in the splanchnic area with a resulting stasis in the inferior vena cava and intense congestion in the hepatopulmonary region. The latter changes are the cause of the abdominal syndrome in pleuropulmonary disease.

JACOB F. KLEIN, M.D.

During the years from 1922 to 1935, 177 cases of primary carcinoma of the vulva were treated by electrocoagulation in the Radiumhemmet. Sixty-seven additional cases in which only palliative measures, such as telerradiumtherapy, could be used are also considered in this report. Sixty-one per cent of the patients were sixty years or more, while 33 per cent were seventy years or more. In the majority of the cases, a chronic atrophic vulvitis preceded the carcinoma. The duration of the carcinoma before admission was usually less than one-half year, or one year at the most. Ulceration and secondary infection occurred early and produced malodorous and bloody secretions, or cystitis. No active treatment had been done on these patients before they were referred to the Radiumhemmet, except occasionally a biopsy, which according to Berven is undesirable unless done in immediate conjunction with the main operation.

In 124 patients the primary tumor was localized on the labia, in 38 on the clitoris, and in 15 on the posterior commissure.

Berven subdivides his cases into 4 groups according to local involvement. Group I contains tumors which occupy only a part of the vulva, and are not ulcerated. There were 13 of such cases, of which 11 (85 per cent) were without symptoms after five years or more.

Group II contains tumors which also are localized on only a part of the vulva, but are ulcerated. The secondary infection frequently led to inflammation of the regional lymph nodes. There were 52 patients in this group, of which 23 (44 per cent) were symptomfree after five years or more.

Group III contains tumors which had spread to neighboring parts of the vulva by continuity or by contact, and those which had a twofold site primarily. This group was made up of 73 patients, 24 of which (33 per cent) were symptomfree five years or more after treatment.

Group IV contains tumors which had spread beyond the vulva. Of the 39 patients in this group, 7 (18 per cent) showed a cure of five years or more.

According to the presence or absence of metastases, the following 3 stages are differentiated.

In Stage I the lymph nodes were either normal or inflammatory, i.e. enlarged but soft. Of the 81 patients with this finding, 48 (59 per cent) were symptomfree five years after treatment or longer.

In Stage II the lymph nodes were enlarged and hard, with perinodal infiltration; they probably already contained metastases. This type was found in 70 patients, and 16 of them (23 per cent) lived and were well five years after the treatment.

In Stage III the lymph nodes were enlarged, hard, immobile, and almost certainly presented inoperable metastases. Of 26 patients with this finding, 1 was symptomfree five years after treatment.

The diagnosis which led to the classification of 81 patients as being in Stage I was found wrong by histological study or in the further course of the condition in only 15 cases (20 per cent).

The diagnosis was verified in all but 6 cases by histological examination and in these 6 cases the clinical course left no doubt that the diagnosis was correct.

Pre-operative medical treatment often helps to improve the result, e.g., bronchitis, cystitis, and pyelitis should be treated carefully before operation.

Necrotic tumors should be prepared by hygienic measures, or by resorption treatment with the roentgen rays.

Anesthesia was formerly induced with chloroform, now evipal-sodium is used intravenously, and usually only 2 to 5 c cm of the 10 per cent solution is required.

The electrosurgical operation can be done with any modern instrument. Either one small electrode locally with a large one on the abdomen or on one arm are used, or bipolar active electrodes. After superficial coagulation, the tumor masses are taken between two migratory electrodes and destroyed. Also the apparently tumorfree parts of the vulva are destroyed in this manner. One proceeds from above downward, from the clitoris towards the commissure in order that ascending hot steam will not produce indeterminable damage in the untreated areas. The depth of coagulation is governed by the findings gained from occasional incisions with a plain scalpel especially near the symphysis. Especial care is necessary around the urethra which sometimes may have to be destroyed up to the external sphincter. Undue heating and carbonization is prevented by constant irrigation of the field with cold water. In tumors close to the rectum, a small piece of ice inserted rectally serves to protect the rectal mucosa. The operation takes from three to ten minutes, hemorrhages are rare and easily controlled by coagulation.

Postoperatively, there is almost no pain. In the second and third weeks the coagulated tissues are demarcated, and frequent irrigations with potassium permanganate are needed to cleanse the area. Secondary hemorrhages are also controlled by coagulation. After three weeks, there is a clean granulating area, and the patients get up. During demarcation, there may be some fever, from 38 to 39°C. Healing is complete four or five weeks after the operation, and the patients are then discharged. The scar after this treatment is soft, non-adherent, usually non-shrinking, and there are no keloids. There were 10 deaths (6 per cent) in the author's series postoperatively, 7 of the patients died of pulmonary embolism, and 3 of pneumonia.

Berven believes that the tumor cells are especially thermosensitive and quotes experimental evidence in support of this belief.

The regional lymph nodes have been treated with telerradium exclusively since 1920, while from 1922 to 1929 roentgen rays were used also. In each groin, two fields of about 5 cm in diameter are centered, one medially, to include the lymph nodes around the large vessels, and one laterally 6 or 7 cm to the side. In Stage I, the patients get from 2700 to 3600

roentgens within twelve or sixteen days. In the Stages II and III 3600 roentgens are given. Occasionally additional roentgen treatment is given through a dorsal field. The reactions are moderate and if ulcerations occur they heal in the sixth week after the treatment. Close supervision within the first half year will indicate whether secondary irradiation is advisable.

Surgical extirpation of the regional lymph nodes was done rarely only in 38 of the 177 cases reported. Radioknife surgery was disappointing in this procedure in 3 cases and therefore was abandoned in favor of the cutting knife. Lymph node extirpation was limited to the superficial and deep inguinal

nodes. There was usually poor healing after the radium and roentgen treatments. Therefore a new technique was developed in 1934. Hybbinette, the surgeon collaborating with Berven, began to remove the skin, subcutis and superficial and deep inguinal lymph nodes *en bloc* and to close the skin wound primarily with Thiersch grafts. The results were good only 5 of the 38 patients treated surgically in this manner died from the operation. In 3 of the 38 patients no metastases could be found microscopically in the removed nodes. Thus only 35 patients can be considered in evaluating the permanent cure. Six were symptom-free after five years or more.

HEINRICH LAMM, M.D.

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

oege, A., and Schnee-hagen, H. A Contribution to the Question of the Intra-Uterine Transmigration in Tubal Pregnancy. (Ein Beitrag zur Frage der inneren Ueberwanderung bei Tubengraviditaet) *Zentralbl f Gynaek*, 1940, p 1912

After a detailed survey of previous publications relating to this subject, the authors state that intra-uterine transmigration in tubal pregnancy has never before been definitely proved. They report a case of their own which proves the occurrence of this phenomenon on the basis of histological studies.

A woman, aged twenty-eight years, whose right adnexa had been removed previously for ectopic pregnancy, underwent a second laparotomy on the suspicion of another extra-uterine pregnancy. The rupture was found in the adnexal stump at the right edge of the uterus, while the solitary left ovary contained the corpus luteum of pregnancy. Serial sections of the excised right uterine cornu showed an open tubal lumen with well preserved mucosa, and a lumen even behind the site of the rupture, although here the mucosa had already become defective. However, $\frac{1}{2}$ cm from the end of the stump, the lumen became indistinguishable. The authors believe it impossible that a previously open stump had recently closed. They assume on the basis of histological studies, several of which are published in the original article, that there was a true internal transmigration from the left ovary into the open lumen of the stump of the right tube.

(VOLK) HEINRICH LAMM, M D

Kasimoto, S., Okai, K., and Yori-hudi, T. Intra-Abdominal Hemorrhage from Spontaneous Rupture of a Subserous Blood Vessel of the Uterus During Pregnancy. *Jap J Obst & Gynec*, 1940, 23 238

A case is described in which a massive intra-abdominal hemorrhage due to the rupture of a subserous vein in the posterior wall of the uterus, occurred in the ninth month of pregnancy. The patient was a thirty year-old para-iv. Her previous obstetrical experiences had been uneventful. She had twins and hydramnios. Under the diagnosis of premature separation of the normally implanted placenta, the abdomen was opened. Dead twins were removed from the uterus. After the true diagnosis had been determined, the uterus was removed. The patient recovered. Eleven similar cases found in the literature are reported briefly.

No case exhibited a hemorrhagic diathesis, nor was external violence a factor. In all of the cases the hemorrhage was due to spontaneous rupture of a vein, possibly because of fragility of the venous wall. Some of the cases were accompanied by varices elsewhere. Overdistention of the uterine wall may also

be a factor, it was present in the authors' case as well as in several others. All but 2 cases occurred in multiparas. In 3 cases the hemorrhage occurred in the eighth or ninth month of pregnancy. In the remaining cases, it took place at the time of labor. In most cases the rupture occurred on the postero-lateral wall of the uterus.

The symptoms vary with the degree of the hemorrhage, but usually there is a sudden sharp pain in the abdomen, followed by pallor of the skin, a rapid, weak pulse, difficulty in respiration, coldness of the hands and feet, cyanosis, apprehension, and signs of acute anemia. The abdomen and uterine wall become distended and tense, which makes the palpation of fetal parts difficult. There is intense pain.

Not one of the cases in the literature was clinically diagnosed as such, but the true diagnosis was revealed by operation or autopsy. Most of the cases were diagnosed as premature separation of the normally implanted placenta. There is no satisfactory means of distinguishing between the two.

The prognosis is unsatisfactory. Eight of the 12 mothers died, also, the severity of the hemorrhage usually results in the death of the fetus.

Rupture of a blood vessel can be treated by suture following cesarean section. However, if it is desirable, Porro's operation may be performed. This procedure would depend upon the condition of the uterus, the position of the rupture, and the age of the patient.

DANIEL G. MORTON, M D

Neuweiler, W. Polyneuritis during Pregnancy. (Polyneuritis in der Schwangerschaft) *Med Klin*, 1940, 2 1179

Polyneuritis is quite a frequent complication of pregnancy if its numerous mild forms are taken into consideration. The extremities are principally involved, the region of the ulnar and median nerves, but the regions of the sciatic and the peroneal nerves and of the sacrum are often attacked, while neuralgia of the face is much more infrequent. In addition to these neuralgic disturbances, a decrease in sensibility up to complete loss of sensation may occur in the neuritis of pregnancy, and even symptoms of paralysis may be observed, although they are quite rare according to the experience of the author. The disease picture usually sets in during the last third of pregnancy, but it is often found in the beginning of pregnancy, and is generally accompanied by hyperemesis. In fact, the severest forms of polyneuritis, which appear frequently in combination with Korsakoff-like psychoses, are observed especially in the presence of serious hyperemesis. Their prognosis is very grave and they show a mortality of 25 per cent.

The polyneuritis of pregnancy is considered nowadays as due to a Vitamin B₁ deficiency. It seems that at times the increased Vitamin B₁ demands of

pregnancy (the requirements of the child) at others a deficient Vitamin B₁ intake resulting from unfavorable dietetic conditions such as an increased carbohydrate intake and diet poor in vegetables (the so called protecting diets) play a part in the origination of the hypovitaminosis. In addition special changes in the gastro-intestinal tract and in the function of the internal organs such as are often observed in pregnancy and which may result in impairment of resorption may also lead to Vitamin B deficiency. Certain diseases such as pyelitis may have a similar influence during pregnancy. The relations of Vitamin B₁ to the nervous system are very intimate and the disease picture of polyneuritis is accepted as an intoxication of the nervous system caused by abnormal products of metabolism such as for instance pyruvic acid and probably also other substance.

The results of the treatment of true polyneuritis of pregnancy with Vitamin B preparations are extremely favorable. The prophylaxis recommends in healthy pregnant women consists mainly of the administration of an appropriate diet and the diet must be specially watched in cases of hyperemesis. In the actual treatment with Vitamin B preparations it is recommended to give high doses at least 10 mgm but as a rule from 20 to 30 mgm are given at first intravenously and later intramuscularly in combination with aneurin tablets. The simultaneous injection of suprarenal-cortex preparations to increase the processes of resorption and of phosphorylation in the organism has proved to be useful. The experience of the author shows that as a rule healing occurs in 80 per cent of the patients however recurrences which are then refractory to Vitamin B treatment are not infrequent.

(NEUWE ER) R. CR. DR. K. MEL. M.D.

LABOR AND ITS COMPLICATIONS

Cornell E. L. *Objctions to Induction of Labor in Normal Pregnant Women* *Am J Ob & Gy* 104 4 438

For the purpose of this article a series of 200 consecutive normal pregnant women were studied. Data similar to those used by other authors in an effort to influence the medical profession on interference with pregnancy at or near term were secured. All patients who presented signs of toxemia or of any of the accidents of labor were eliminated. The average age of 11 was twenty-eight and six tenths years at delivery. There were 9 primiparas and 109 multiparas. The average weight of all the babies was 3.07 gm. The largest baby weighed 4.55 gm and the smallest 84 gm.

Twenty-five babies weighed 4000 gm or more and the others were about equally divided in the groups to be described.

The delivery dates being known and the expected term dates being computed the 200 patients were divided into four groups (A) those who delivered in the interim between seven days before term and the expected term (B) those who delivered within one

to seven days past the expected term (C) those who delivered eight and fifteen hundredths day after the expected term and (D) those who delivered sixteen days or more after the expected term.

The number of babies weighing over 4000 gm averaged about the same in Groups A and B around 10 per cent. In Group C the percentage was raised to 15 per cent and in Group D to 33 per cent. It is true therefore that babies carried past the expected term are larger. Most of the babies (151) weighed from 3000 to 4000 gm. There were 5 babies that weighed less than 2500 gm. Only 1 baby weighed more than 4500 gm a percentage of 5 which compares with the findings of Foss and Potter (10.1 per cent in 2029 deliveries at the Chicago Lying-in Hospital). There is a wide variation in the weight of babies delivered by normal women. The most marked differences were in the group of patients who delivered from even day before term to term. Here the smallest baby weighed 1814 gm and the largest 4400 gm and no mistake was made in the reckoning by the patient or the physician. The pediatricians who examined the large babies hesitated to say definitely that any of them were postmature. There was no fetal or maternal mortality in this series and so far as is known all the babies are alive and well at this time.

From observation and the review of the literature the author firmly believes that physicians are not justified in interfering with the natural processes of pregnancy and labor in normal women. He protests against such a procedure.

Wissmann A. *Labor in Contracted Pelvis (D Geb t b m B ke) Zich f Geb h k*
Gy k 94 33

The author presents a detailed report on labor with contracted pelvis in an obstetrical series of 11329 deliveries of which 20 per cent were associated with contracted pelvis as determined by exact pelvic measurements. After a detailed discussion of the mechanism of labor in contracted pelvis and the technical procedures in the conduct of such labors the author presents a classification of contracted pelvis as to grade and severity.

In 15 of 50 women with contracted pelvis of the first degree (with a conjugate vera of more than 9 cm) which comprised 54 per cent of all the contracted pelvis a cesarean section was done and in 1 multipara a symphysectomy was necessary. The percent requiring surgical intervention was therefore 14. The cause of fetal death in contracted pelvis of the first degree is due less to the contracted pelvis than to other complications such as the consideration did not interfere with the watchful waiting conservative attitude in this condition. There is a definite result of labor in the generally contracted and in the slightly contracted pelvis in the case of first degree contraction. In 33 deaths there was no particular reason for blaming the contracted pelvis or the conduct of labor for the mortality.

Twenty-five per cent of all contracted pelvises belong to the group with second-degree contraction, and 30 per cent of these present an insurmountable obstacle to labor. Cesarean section had to be performed in 19 per cent of the generally contracted pelvises, in 21.5 per cent of the flat rachitic pelvises, and in 35 per cent of the generally contracted flat pelvises. In the generally contracted flat pelvis there is no need to sub-classify the second degree of contracted pelvis since normal spontaneous birth may occur with a conjugata vera under 8 cm if the fetus is not too large, spontaneous birth is not uncommon with a conjugata vera between 8 and 8.5 cm.

Also in the other types of pelvis a further sub-classification is not necessary. There was no essential difference in the course of labor with generally contracted pelvises from labor with flat rachitic pelvises if the conjugata vera was the same. With a conjugata vera of from 8.1 to 8.5, spontaneous delivery occurred in 60 per cent of the cases whether there was a flat rachitic pelvis or a generally contracted pelvis. In the cases of generally contracted pelvis of Group I it was necessary to do 10 forceps deliveries for asphyxia in the presence of persistent transverse position. In Group II this was not observed.

Grade III of contracted pelvis occurred 4 times in the generally contracted pelvis and 30 times in the flat rachitic pelvis. On 1 occasion a symphysiotomy followed by version and extraction resulted in a living child. In 20 cases cesarean section was done and only one child was lost because of cord strangulation and another died because of poor vitality. One mother died of acute cardiac failure. Contracted pelvis of Grade IV occurred only in flat rachitic pelvises. There were 4 such cases which were treated by cesarean section without harm to mother or child.

Transversely contracted pelvises occurred in 321 cases (15.1 per cent). In the latter group the need for operative interference is greater than in other types. In the cases of transversely contracted pelvis (to which group the sport pelvis belongs) cesarean section averages 14.4 per cent and forceps extraction 21.8 per cent. In a group of 25 genuine funnel pelvises cesarean section was done 8 times (the interspinous distance in these was less than 7 cm).

Particularly unfavorable are the conditions in the generally contracted pelvis when there is transverse contraction at the outlet. The flat rachitic pelvises with transverse contraction at the outlet are more favorable, since the transverse narrowing is not so extensive because of rachitic changes in the pubic bones. In the pelvises with osteomalacia as well as with pseudo osteomalacia the deformity is so extreme that the mechanism of labor is impossible.

In the cases with a flat rachitic pelvis of Grade I there were 3 face presentations with spontaneous delivery, and of Grade II a face presentation and a forehead presentation. One child was born spontaneously in facial presentation in the presence of a generally contracted pelvis. For the proper conduct of labor it is necessary that every patient with a contracted pelvis presenting a conjugata vera less

than 9 cm be admitted to hospital supervision although correct estimation of this condition and exact diagnosis may be very difficult. In the primipara the internal testing and palpation of the pelvis should be performed from four to six weeks before the termination of labor. In multiparas the history readily gives an indication of the previous difficulties and such women are accustomed to seek special care early as the result of such previous experience. In the presence of any abnormal position of the fetus (transverse or oblique) or malposition of the head in the presence of any degree of pelvic contraction special obstetrical supervision is necessary.

In the contracted pelvis of Grade I spontaneous delivery should be encouraged and operative intervention should be used in the cases in which a large fetus has been carried past term and there is considerable malproportion of the parts (1.4 per cent). In Grade II of contracted pelvis it is most difficult to decide on the conduct of labor since about half of the cases may deliver spontaneously. The decision in Grades III and IV of contracted pelvis is easy since these cases always require cesarean section. Conservative management of labor has demonstrated that many more of these cases may deliver spontaneously than has been hitherto suspected. In the conduct of labor we must be aware now that the maternal mortality in such cases cannot be improved very much: it is now 0.75 per cent, or 16 deaths in 2,115 deliveries. Perhaps there may be an improvement in the maternal mortality from improvement of the operative technique according to Doerfler. The entire fetal mortality including all dead, macerated, and moribund fetuses delivered at the clinic among a total of 2,115 deliveries was 114, barely 5 per cent. The fetal mortality has been 2.5 per cent.

This study demonstrates the correctness of expectant conservative therapy of labor in contracted pelvis. (H. WINKLER, JACOB E. KLEIN, M.D.)

Sheldon, C. P. Pelvic Delivery under Local Infiltration Anesthesia. *Ver. Englard J. Med.*, 1941, 224-404.

Sheldon, of the Harvard Medical School and the Boston Lying-in Hospital, reports a technique of delivery under local anesthesia with 1 per cent novocaine, which he concludes was "eminently satisfactory" in 64 cases. He describes the nerve distribution in the female perineum and external genitalia and shows diagrammatically his technique of local infiltration through five wheal sites to block the branches of the inferior hemorrhoidal, the ilio-inguinal, the pudic, and the small sciatic nerves. He advises as to proper novocaine preparation and equipment to carry out the procedure. The labor is conducted under analgesic agents in order to facilitate delivery under local anesthesia. Nitrous oxide is administered with each pain in the latter part of the first stage and "until the baby's head strikes the pelvic floor."

The author believes the routine discussed gives the most satisfactory results in normal and low-

forceps deliveries. Also spontaneous breech deliveries manual rotation of the head. Scanzoni's operation the delivery of face and brow presentations after flexion and even mid forceps deliveries can often be conducted under local infiltration anesthesia.

WILLARD G. FRECH, M.D.

PUERPERIUM AND ITS COMPLICATIONS

Arbogast W. and Emlcher E. M. The Treatment of Puerperal Tetanus. The Report of a Cured Case. (D. B. handling T. to U. pu. f. rali. Mitteleingenegeheilt n. Falles) *Z. f. d. B. f. Gy.* 194 p. 195

A thirty-one year-old woman who had hitherto had 2 normal pregnancies was admitted to the Ludolph Krehl Clinic in November 1930 on the suspicion of tetanus. The usual family history was essentially negative. Ten days before admission the patient had performed a vaginal irrigation with soap and water after a cohabitation. She had used a rubber bulb syringe with a metal connecting tube for this purpose. She had done such vaginal irrigations for years. After this last irrigation there was a considerable amount of bleeding which continued more or less until the day of admission to the hospital. Eight days after the douche the patient was unable to move her jaws. On the next day there was a spasm of the muscles. Incontinence that rendered speaking and chewing impossible. On the tenth day the jaws could not be opened any more and there was a progressive stiffness of the neck so that the attending gynecian advised immediate hospitalization.

No external wound was seen. Since there was no doubt as to clinical tetanus a lumbar puncture was performed under avertin anesthesia. At this time 12,500 units of tetanus antitoxin were administered intramuscularly and intraspinally. The patient was admitted to the women's ward since a genital infection was considered most likely according to the history. On bimanual examination the uterus was found to be definitely enlarged and stiff. In the absence of other wounds or pathology a uterine infection was suspected and under avertin anesthesia a vaginal hysterectomy was done. Examination of the preparation revealed an ulcer the size of a penny in front of the internal os. The endometrium showed scattered remains of decidua. Animal tests were positive. In twenty days the patient received 720,000 units of tetanus antitoxin. Of this amount 177,500 units were given intraspinally and 54,500 injected intramuscularly. In eighteen days of treatment the patient had received 128 gm. of aertin.

(THEO. FLETZ) J. COB E. KLEIN, M.D.

NEWBORN

Thompson W. B. and Krahulik E. J. Resuscitation of the Newborn Infant. *J. S. g. Obst. & Gyn. c.* 441 49 69

The various modes of resuscitation are discussed. Four hundred and eight of 2,007 newborn babies

received one or more types of resuscitative efforts. The method of Sylvester of Byrland and De and the Schultz swing are mentioned and condemned.

Mouth to mouth breathing is the oldest mode of resuscitation available and it still remains a method of distinct value. Too strenuous blowing must be guarded against for fear of rupturing alveoli or of distending the stomach. Immersion offers no advantage over the maintenance of body heat with warm blankets and with occasional sensory stimulation by slapping the buttocks or soles of the feet. It is probable that the restoration of a pink color to the skin of the infant immersed in hot water is due not to improved circulation but to a capillary dilatation in the skin itself. Tubs in the opinion of the authors should be relegated to the bathroom.

In numerous writings, Vandenhenderson has urged the employment of oxygen and carbon dioxide in restoring the respiratory impulse. When tracheal intubation is not performed, this may be done with an intranasal catheter. Administered through the nasal catheter is preferable to any type of mask. The application of Henderson's techniques is shown in that 92.6 per cent of the apneic babies received 5 per cent carbon dioxide in oxygen. Carbogen is the most available of modern treatments and richly deserves the wide usage which it enjoys.

The tracheal catheter has come into widespread use. Two approaches in its employment are available. The first is by the sense of touch the second visual and requires the use of the laryngoscope. Suction is then applied to remove mucus and fluid before sufflation of the air or carbogen is begun. Once the catheter is inserted a carbogen or oxygen may be introduced at will. The maximum caution to be observed is that only low pressure should be employed not exceeding 4 to 5 mm. of mercury.

It is believed that alveolar collapse by reducing the threshold of the respiratory center to the existing carbon dioxide tension in the blood stream. It increases the depth of respiration and their frequency but the authors have seen little effect if any prior to primary respiratory effort. Coram also has been proposed as an aid in apnea neonatorum. Its value is questionable.

Adrenalin is disappointing but it may have influenced the ultimate outcome in 2 of 8 cases. The authors have had no experience with the various mechanical types of respiration apparatus. They doubt their value.

The deeper grades of analgesia are responsible for the majority of the babies that need resuscitation but no one routine was sufficiently represented to warrant a specific analysis. However, an ligation is a valuable advance in obstetrical ministrations and should not be ruled by absolute.

One hundred and sixty-seven cesarean sections were performed. In 55 of these with 56 babies resuscitation was necessary. The authors have noted a rather frequent inclination to breathe among babies following section. A narcotic is not given pre-operatively but 3 gr. of pentothal bitar are ad-

ministered two to three hours prior to the scheduled operation. Despite this moderation, a considerable number of the babies are decidedly apneic at delivery. This may have been due to the anesthetic agent used usually cyclopropane.

Resuscitation of the premature baby presents additional problems. With any appreciable shortening of the period of gestation, a marked immaturity of the respiratory reflex is apparent. Oxygen requirements increase directly with the degree of prematurity. The importance of removing fluid and mucus from the trachea is stressed. This should be secured by immediate resort to the tracheal catheter. The effect of analgesics upon premature babies is especially marked. Therefore the safest conduct of a premature labor omits the use of analgesia.

The need for early attention to the newborn has been vastly increased by operative procedures and the widespread use of analgesics. By and large, the more potent sedatives result in apneic babies. The intelligent employment of carbocaine and the intratracheal catheter is a necessity if present methods of sedation are not to fall into disrepute. Cesarean babies and premature babies demand special care.

DANIEL G. MORTON, M.D.

Brander, T. The Frontal Fontanel Bone (Os Fronticuli Frontalis) and Its Clinical Significance. Report of a Case (Ueber den Stirnhirnstellenknochen [Os fonticuli frontalis] und dessen klinische Bedeutung, anlässlich eines beobachteten Falles). *Leb. abh. d. gyn. u. id.* 1900. 20: 372.

Brander gives the first survey of the literature on the frontal fontanel bone. While there are numerous reports from anatomists there are very few from clinicians. Yet there is some clinical importance of this rare anomaly. Of the 3 cases of which clinical observations were reported previously only 1 did not end fatally. The frontal fontanel bone occurs about once in 100 newborn babies. Its usual shape is that of a rhombus. It originates probably from an atypical primary center of ossification. As its incidence is higher in cases of hydrocephalus, it appears as though it had the biological task of filling in abnormally large fontanels. Whether there is a hereditary cause is unknown. Clinically it may lead to a wrong diagnosis of the presentation of the fetal head before parturition. Also, fetal birth injuries may be more frequent in children with fontanel bones because of lesions of the sagittal superior sinus due to the irregular piece of bone. As the fetal head with a fontanel bone may be less plastic than a normal head, dystocia may be more frequent in these cases than usual. Premature cranial synostosis, according to some authors, may be due to fontanel bones and lead to tower head.

Brander reports a case. A primipara, aged thirty, delivered a baby boy of 2,950 gm. after a fairly normal pregnancy in head presentation. The delivery was normal except for long duration, and a vaginal tear. Two and one-half weeks thereafter the boy showed slight asymmetry of the facial innervation,

but otherwise the neurological and spinal fluid study was negative. There were cephalhematomas above both parietal bones. The frontal fontanel contained a bony plate 3 by 4 cm. in size. There was premature ossification noticeable soon thereafter and after about one quarter year the fontanel bone had formed synostoses with both the parietal and frontal bones. Only the anterior corner of the fontanel was still soft. At eight months, the boy was slightly rickety, had a mild bronchitis but neurologically and developmentally appeared normal. The skull was very narrow.

In this case no internal examination had been made during delivery, thus there was no chance for a mistaken diagnosis of presentation, but even after birth the palpatory findings were baffling. The mother had an out-pouch on lower head.

HEINRICH LAMM, M.D.

MISCELLANEOUS

De Snoo, K. Pregnancy, Labor, and the Puerperium in the Macacus Cynomolgus (Schwangerschaft, Geburt und Puerperium bei *Macacus cynomolgus*). *Verh. Naturh. Ver. Berl.*, 1900, 45: 173.

The author investigated pregnancy, labor, and the puerperium as well as the regeneration of the uterine muscle after parturition in 18 Java monkeys. The position of the fetus was determined with x-rays, and films were made of the uterine contractions during labor with the abdomen opened. The normal birth being filmed. Post partum involution was followed and the changes of the uterine mucosa during pregnancy, as well as its regeneration in the puerperium, which were removed on the first, second, third, fifth, sixth, tenth, thirteenth and seventeenth days and studied serially. The number of head presentations increased with the duration of pregnancy. In only 1 instance was a breech presentation observed at the normal termination of pregnancy. Labor itself was witnessed only twice because the monkeys delivered at night and also because the betrahal that they are in labor occurs when they have bearing down pains. They generally devour the placenta. There were a few false and premature labors and 1 instance of retained placenta with putrefaction much as occurs in the human being.

The uterine contractions are not peristaltic. The pelvis becomes roomier through the relaxation of the joints. The inlet is long-oval, and the posterior wall is made up of the short sacrum and the very movable vaginal introitus is round and lies directed toward the rear. Therefore, the birth canal is not curved as in man but straight. In the cervix there are present several small and two large ridges which are present ages that are very firm and shut off the uterine cavity. The ridges lose their firmness during labor, first the lower and then the upper ones. At the same time the entire cervix softens and permits the passage of the fetus. As in the human being the dilation of the

cervix is preceded by a relaxation of the fuchsinophilic tissues. During pregnancy a lower uterine segment is formed from the part of the cervix above the uppermost ridge. Because of the distention caused by the growing embryo the muscle wall acquires a laminated structure in the last months of pregnancy which provides a normal solid foundation for labor. During pregnancy a decidua develops with compact and spongy components. The decidual cells and glands degenerate to a much lesser degree than in the human being. The placenta is composed of two parts, the larger portion with the umbilical cord lying on the anterior wall and the smaller portion on the posterior wall. Rather marked variations exist, however. The placenta is hemochorial, the intervillous space receiving its blood from the large arterial sinuses.

After delivery the sinuses thrombose and with the uterine contractions and involution they arch more and more into the lumen of the uterus until during the first day after delivery they are expelled with the rest of the decidua. On the thirteenth day the first signs of regeneration are plainly visible and on the seventeenth day a well developed thick normal

mucosa is present. Evidently regeneration does not take place from retained cells of the decidua but occurs as in the human being from hitherto undifferentiated cells. Thus there is a very close resemblance between the pregnancy labor and puerperium of man and those of the macacus.

These facts would indicate that the generative processes in man have changed but little since the branching off of the lower monkeys from the common apenstaltic stem, that is, since the upper eocene period. In the opinion of the author the lower monkeys originated from primitive two-footed animals which sought safety in the trees and adapted themselves to a life in these trees. One of the results of this mode of life was that the upper extremities were no longer free and the cerebrum did not develop further as in the two-footed animals. Nevertheless the monkey has a large head at birth with a large brain just like the human infant; in fact it is larger than that of the infant. This indicates that the large head of the newborn has nothing to do with the intellect but is primarily concerned with the insurance of a normal head position and a safe normal birth. (DE SNOD) JOHN L. LINDBQUIST, M.D.

GENITO-URINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Campbell, M F Injuries of the Kidneys *Surg Clin North Am*, 1941, 21 443

Injuries of the kidney are relatively common and are always grave. The mortality varies from 3 to 40 per cent. The patients are predominantly men, and one-fourth of them are children.

The classic history of injury to the loin or upper trunk followed by pain, hematuria shock, and sometimes perirenal hematoma and/or anuria, at once suggests renal injury. Excretory urography will suggest the correct diagnosis in 2 of 3 cases but when this method is not entirely satisfactory, retrograde pyelography is demanded. The surgeon should be prepared, however, to operate immediately following the instrumental investigation and pyelography. Conservative renal surgery is the aim, but nephrectomy will be required in at least 2 of 3 cases of severe injury. Moreover, the patient should not be allowed to die either from the attempt to make a precise anatomical diagnosis or to repair a kidney that should be removed.

JOHN A LOEF, M D

Lowsley, O S, and Menning, J H The Treatment of Rupture of the Kidney *J Urol*, 1941, 45 253

Traumatic rupture of the kidney has taken on added significance in recent years because of the increased automobile, sport and industrial accidents. The old idea of watchful waiting if the hematuria is not excessive has been modified by the authors, who believe that with improved surgical technique the conservative thing to do is to perform an exploratory operation and stop the bleeding with a pad of fat held in place by means of ribbon-gut. The authors have proven to their satisfaction that adequate approximation and an anatomical repair was secured by the use of ribbon-gut in an animal experimental study, which they describe.

From a review of 82 cases of rupture of the kidney the authors conclude that any patient with a history of trauma who has hematuria for more than twenty-four hours should have an exploratory operation, as this is now considered much more conservative than hopeful waiting.

D E MURRAY, M D

Campbell, M F Ureterocele *J Urol*, 1941, 45 598

Ureterocele is a congenital obstructive lesion in which secondary urinary infection is the important complication. The resulting persistent pyuria, too commonly designated "chronic pyelitis," is the symptom which almost always prompts the urological diagnostic investigation.

Ureterocele is not unusual, it was observed in 1 of 30 cases of chronic urinary infection in children. It is notable that failure to identify ureterocele in the young sometimes accounts for premature death. For this reason the true incidence of the condition is

doubtlessly lower in the cases of adults than in the young.

The clinical picture is almost always that of "chronic pyelitis" and urinary backpressure pain may be a prominent symptom. The diagnosis is readily made by urological examination. Urography is frequently helpful, especially when the ureterocele produces a cystographic filling defect.

Removal of the obstruction is the immediate treatment. The lesion is excised transurethrally with the McCarthy prostatic resectoscope and the cutting loop progressively removes large segments of the flabby ureterocele wall. Bleeding is controlled by coagulation. Eradication of urinary infection, calculi or other complicating lesions is the essential accessory therapy.

JOHN A LOEF, M D

Spence, H M Stones at the Ureteropelvic Junction *J Urol*, 1941, 45 579

The author reports 24 cases of stones at the ureteropelvic junction. Urography showed functional or anatomical damage to the kidney resulting from the stones in 23 of the 24 cases. Except for diagnostic purposes, the use of cystoscopic procedures was ill-advised in this group. This was strikingly brought out in the synopsis of the fatal cases. Early surgical removal of the stone at the ureteropelvic junction is the treatment of choice.

JOHN A LOEF, M D

BLADDER, URETHRA, AND PENIS

Kimbrough, J C The Treatment of Bladder Diverticulum *J Urol*, 1941, 45 368

This article presents a study of the treatment of 30 patients with diverticula of the bladder. Three hundred and seventy-five patients were treated by operative procedures for obstruction of the bladder neck. The incidence of diverticula was 8 per cent. This report includes only true diverticula that have intact muscular walls lined with modified bladder mucosa. Saccules and shallow depressions, due to the outward protrusion of the mucosa between hypertrophied muscle bundles, have not been considered.

It is universally agreed that obstruction of the bladder neck except in the very rare congenital type, is essential to the formation of diverticulum, the "blow out" effect described by Keyes. Because of the small percentage (5 to 6 per cent) of the cases of bladder-neck obstruction that develop diverticula of consequence, it is evident that there are definite factors of "soil preparation" always present in the bladder wall. The back pressure must be present over a period of several years, for the formation of the sac is a slowly progressive process. Prostatic hyperplasia with varying degrees of fibrosis and median bars accounted for the obstruction in 22

cases in this series. Bladder neck fibrosis without apparent prostatic enlargement was present in 8 cases. Urethral stricture was an etiological factor in 2 cases. The family history was significant in only 1 case that of a patient fifty-eight years old whose father and one brother had been treated for prostatic hyperplasia and diverticula. Forty-three cases of prostatic carcinoma were seen, only 2 of which were complicated by diverticula.

Age incidence was as follows: patients up to and including those fifty years of age, 4 cases; from fifty-one to sixty years, 9 cases; sixty-one to seventy, 14 cases; seventy-one to eighty, 2 cases; and more than eighty years, 1 case.

The symptoms were those of prolonged obstruction at the bladder neck with the associated results of infection. The intensity of the disturbance was directly proportional to the extent and severity of the cystitis. In no case was there evidence leading to a diagnosis of diverticulum on symptoms alone. It appears that the obstruction in the cases had been present over a period of several years. The residual urine varied from 50 to 3,000 c.c.m.

Symptomatology and physical examination offer little to indicate the presence of diverticula. The cystogram gives the most accurate information relative to the size, location, and number. Cystoscopy confirms the degree of obstruction, the number, size, location, and the relation of the urethral orifices to the diverticular openings. The importance of cystoscopic examination is equaled only by cystography.

Three of the author's cases were complicated by bladder calculi. Two cases of carcinoma were present. In 1 patient the urethral orifice was located within the lower aspect of the diverticulum. Ureteral regurgitation and hydronephrosis were demonstrated on cystographic examination. One case of urethral stricture and a ruptured diverticulum as noted in the series. A case of bladder tuberculosis with diverticulum at the fundus was present. The tuberculosis apparently had healed with bladder neck fibrosis.

The rational method of treatment resolves itself into three distinct phases:

1. Measures to improve the general health and to eradicate bladder infection, this is accomplished by urethral catheter drainage, bladder irrigation, and by suprapubic cystostomy.

2. Surgical removal of the diverticulum.

3. The treatment of the bladder neck or urethral obstruction, this is accomplished by (a) dilatation, (b) transurethral resection, (c) prostatectomy, perineal or suprapubic.

Indications for operative treatment are: (1) diverticula complicated by tumors or calculi, (2) large diverticula especially in young men which cause ureteral stasis or urinary retention, (3) diverticula that harbor persistent infections, and (4) diverticula that retain urine after the bladder neck obstruction has been corrected.

Recommended operative procedure for the removal of diverticula are:

1. Intravesical diverticulectomy described splendidly by Young several years ago is at its best in treating small multiple diverticula, especially those densely adherent to the adjacent tissues.

2. Transvesical resection has been employed in cases similar to those selected for intravesical approach except that larger adherent sacs are more readily removed by this method. Intravesical incision is made around the circular neck and the sac is delivered into the bladder by traction on the free pedicle. The insertion of traction sutures into the margin of the bladder wall before the incision is made facilitates closure of the mural defect. Perivesical drains are placed communicating with the area of incision in this procedure. This method has been used in 3 cases and for removing one of the sacs in a patient with multiple diverticula.

3. Extravesical incision has been employed in removing the large sacs. It is the operation of choice in all cases except those of small multiple diverticula. Seventeen cases have been corrected by this method and it has been combined with transvesical excision in 1 case.

The following general principles of the operative procedure are emphasized:

1. Adequate preparation should be carried out. The patient should attain the best general physical condition and the local bladder infection should be eradicated so far as practicable.

2. Safe anesthesia should be employed. Spinal anesthesia (novocaine) not exceeding 100 mgm. held at a level of the umbilicus has been the best.

3. Midline suprapubic incision should be made with adequate bladder mobilization without urinary contamination of the adjacent tissues. It is often necessary to divide the urachus. It is usually desirable to mobilize the bladder before it is opened.

4. Vasectomy prior to or at the time of operation will prevent the annoying incidence of epididymitis.

5. Urethral catheters should be inserted before an attempt is made to separate the sac. It is more satisfactory to carry out the urethral catheterization after the bladder is opened than to precede the operation by preliminary cystoscopy.

6. Select the best method or combination of method suitable for each case: intravesical, transvesical, or extravesical approach.

Adequate drainage of the extravesical space for a period of five or six days is necessary except in the removal of small diverticula by the intravesical technique.

8. Adequate closure of the bladder wall at the site of the excision of the sac should be practiced.

9. Suprapubic cystostomy drainage should be maintained until the vesical neck obstruction is corrected.

10. Allow an ample time interval between the diverticulectomy and the removal of the obstruction at the bladder neck. In our series the average time between operative washings and resection days.

The author performed a prostatectomy in the cases of 14 of 30 patients with a located bladder

neck obstruction for the relief of the urinary obstruction. Thirteen of these operations were done by the suprapubic approach and 1 by the perineal. In 9 patients the bladder neck obstruction was relieved by transurethral resection. JOHN A. LOHR, M.D.

Michaletti, G. Total Inversion of the Bladder: a Pathogenetic and Clinical Contribution (In versione totale della vescica, contributo patogenetico e clinico) *Ped. chir.* Roma, 1940, 47, sez. chir. 481.

Total inversion of the bladder is rare and is the gravest manifestation of the complex series of displacements of this organ. In the literature of the past fifteen years Michaletti has found only 5 cases of inversion through the urethra and 9 through a fistula; he adds a personal case to the latter.

At the age of forty, a woman suffered a vesicovaginal fistula and a third degree laceration of the perineum on the occasion of a severe labor and manual delivery of a large fetus. She refused surgical repair. On admission at the age of sixty-eight examination showed the presence of a large vesicovaginal fistula, total prolapse of the uterus and of the vaginal wall, marked posterior enterocele and partial prolapse of the rectum due to complete laceration of the perineum. She was submitted to two interventions: in the first the vesicovaginal fistula was repaired and the uterine prolapse temporarily reduced; in the second, six months later, the perineum was restored. The result of the intervention is very good.

This case is interesting because the development of the lesions followed a different course from that considered classical and presented the following sequence: cystocele, rectocele, prolapse of the uterus and posterior enterocele. In fact the anamnesis revealed that the patient developed incontinence of urine seven days after the traumatism, prolapse of the rectum two months later, prolapse of the uterus after twelve years, partial prolapse of the bladder after twenty-five years, and total inversion of the bladder after twenty-eight years. It should also be noted that in the few observations on the mechanism of inversion of the bladder the inversion started in the antero-superior or postero-superior wall of the bladder and the trigone was externalized last and much more rarely than the other parts.

In the present case the grave perineal laceration and the vesicovaginal fistula located on Pawli's triangle served to interfere with the usual course of the disorder: the location of the fistula close to the ureteral orifices markedly reduced the pressure which the bladder exerts normally on the anterior vaginal wall. At the menopause with its natural loss of fat and its senile atrophy, when the already labile equilibrium between the intra-abdominal pressure and resistance of the pelvic floor was destroyed, the weakest point was the posterior vaginal wall and the prolapse of the uterus in the present case started with a rectocele. The constant presence of two nodules which protruded from the fistula and were

the ureteral protuberances of the trigone and the absence of symptoms of urinary retention proved that the inversion started with the extrusion of the trigone.

The mechanism of formation of the inversion becomes clear when it is compared to that of a hernia: the traction of the genital prolapse relaxed the natural connections of the trigone and the upper part of the vagina, all the more so as a portion of the latter was already missing because of the presence of a large vesicovaginal defect. Following the descent of the vaginal wall, the posterior part of the trigone which was the first to lose its natural adhesions formed an artificial opening and engaged into it, as the traction became gradually stronger, the supporting and fixing apparatus of the bladder was reduced to the limits of its possibilities: until a sudden increase in the abdominal pressure transformed the partial inversion into a total one.

The prognosis of this case was rather unfavorable from the surgical point of view because of the age of the patient and the presence of a serious unilateral pyonephrosis. The case serves to define more exactly the etiopathogenesis and the clinical picture of inversion of the bladder, of which there are two forms: one occurring by invagination and the other by a slipping of the bladder through a natural or artificial orifice. RICHARD KAMILL, M.D.

GENITAL ORGANS

Campbell, I. W. The Significance of Hypertension in Prostatism with Chronic Urinary Retention. *J. Urol.*, 1941, 45, 70.

A group of 173 patients with prostatism carefully observed is the basis of this study of bladder decompression. Patients with acute retention were catheterized and drained completely at once. The patients with chronic urinary retention were divided into two groups: those with a low systolic blood pressure (below 160 mm.) and those with a high systolic pressure (over 160 mm.). The fall of blood pressure during decompression in those with low pressure was negligible. In those with high pressure decompression was carefully controlled to avoid the sudden drop so frequently seen in uncontrolled drainage. Decompression allows gradual stabilization of the blood pressure and is an important factor in preventing the development of pyelonephritis.

In this series of 173 patients with prostatism only 19 had hypertension. In explanation, the theory is advanced that the hypertension in these patients occurs because of the inability of the upper urinary tract to dilate; this is due to an anatomical factor, an intracanal pelvis. ANDREW McNALLY, M.D.

Lowesley, O. S., and Kilgore, R. N. Total Perineal Prostatectomy, A Modification of a Previously Published Technique. *J. Urol.*, 1941, 45, 106.

The authors present a method of performing total perineal prostatectomy which gives unusually good exposure of the operative field, and makes it pos-

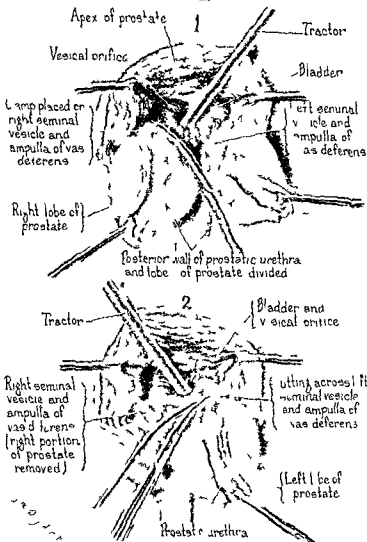


FIG. 1. A clamp placed across the right seminal vesicle and ampulla of vas deferens. 2. The right lateral lobe of the prostate is displaced from the bladder. A clamp has been placed across the left seminal vesicle and ampulla of the vas deferens at the posterior half of the prostate gland. (The vesical orifice of the urethra is then exposed in the manner previously described by Lowrey.)

sible to dissect the prostate gland from the bladder with a minimum of trauma to the vesical sphincter. The ability of the internal sphincter to contract is not destroyed and incontinence does not occur.

Bleeding vessels are clamped and ligated which makes the use of a moist pack and gauze packing unnecessary.

The wound heals with a minimum of drainage and the patient's postoperative hospitalization is shortened.

The procedure is not applicable to cases of suspected or known carcinoma of the prostate gland but in certain cases of benign hypertrophy, calculus and other pathological conditions of the

prostate, in which removal of the gland and its capsule is indicated, this method of performing total perineal prostatectomy offers definite advantages

D. F. MURRAY, M.D.

Mathé, C. P. Thrombo-Anguitis Obliterans (Buerger's Disease) of the Spermatic Arteries, Report of a Case. *Transactions of Western Section, Ann. Urological Ass.*, 1940, 9, 16

The report of a case of thrombo-anguitis obliterans of the spermatic artery is submitted. This exceedingly rare condition occurred in a patient on whom orchidectomy was performed for painful swelling of the left testis.

There is no doubt that many cases of thrombo-anguitis obliterans of the spermatic vessels have been overlooked. Thrombosis of the spermatic vessels is usually confused with tuberculous epididymitis or malignant disease of the testicle. Spontaneous infarction of the testis and that resulting from torsion of the testicle is well recognized, but that occurring from thrombo-anguitis obliterans of the blood vessels of the testis should be borne in mind when a differential diagnosis of diseases of the testicle and spermatic cord is made.

Stasis, trauma, dependency of the limbs, locomotion, change in activity of the circulation as well as age, sex, thermal influences, and the use of tobacco, have been considered predisposing factors which bring about the thrombotic and atheromatous occlusion of Buerger's disease.

Disturbances in the circulation which are produced by extensive obturation of the blood vessels are due to an occluding coagulum or to organization of the connective tissue. Certain pathological changes due to progressive inflammatory processes which take place in the perivascular tissues, as well as in the adventitia, media, and intima of the blood

vessel, regularly accompany the obturating process associated with thrombo-anguitis obliterans. There is thickening of the intima, the media, and the adventitia, together with cellular infiltration and vascularization, whenever thrombosis occurs. The occluding mass frequently terminates abruptly in an apparently normal portion of the vessel involved. To begin with there is acute inflammation, followed by purulent foci, and finally by thrombosis, organization, and canalization, thus all the morphological changes that go on in the process of healing are presented.

The authors emphasize the fact that thrombo-anguitis obliterans of the testicular vessels occurs and this should be borne in mind when a differential diagnosis of diseases of the testicle is being made. Tuberculous epididymitis is usually accompanied by tuberculous lesions in the seminal vesicles, kidneys, or bladder, the finding of which will aid in its recognition. Malignant tumor of the testis may often be differentiated by the employment of the hormone tests now in use for the diagnosis of this disease. Gumma due to syphilitic infection can be ruled out by an adequate clinical examination, including serological tests. Hydrocele of the cord usually transmits light, while spermatocele should give little trouble in its correct diagnosis. The hard mass due to infarction may occur in the epididymis, cord, or the testis proper.

Quantitative determination showing an increase of adrenalin in the blood has been a diagnostic aid in Buerger's disease. In cases of thrombo-anguitis obliterans of the testicular vessels heretofore reported in the literature, this test has not been employed.

The treatment of choice is orchidectomy. The disease is usually progressive and causes such annoying pain and discomfort to the patient that extirpation of the testicle is justified. JOHN A. LOEF, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES JOINTS MUSCLES TENDONS ETC

Loi L. Acute Osteomyelitis Followed up by Roentgen Examination During the Course of Conservative Biological Treatment (L'osteomyélite aiguë suivie d'examen radiographique pendant le cours de traitement biologique) *Chir. 1940 6 343*

The author describes and illustrates with roentgenograms 12 cases of acute osteomyelitis which he treated without operation. In only 1 case was any drug used. In the others the treatment consisted of rest in bed and the application of hot moist compresses to the affected bones. The results of this treatment were followed up by repeated roentgen examinations from the early stage of the disease until the patients were discharged cured.

In general the roentgen images seen in following up the cases showed first necrosis of the bone then absorption of the necrosed bone and finally bone regeneration. Even in the cases with extensive necrosis when the patients came under treatment there was normal repair and finally complete or almost complete restoration to normal. In all of these cases the process remained limited to the area affected at the beginning of treatment. The most striking feature of this treatment was that even when large tracts of bone were necrotic they were absorbed with out the formation of large sequestra. In a few of the cases small cortical sequestra were formed but they were discharged spontaneously and no large central sequestra were formed in any case. Nor was there any diffuse or circumscripted sclerosis of bone which in the usual treatment of acute osteomyelitis interferes so seriously with healing.

Necrosis was not prevented in any of the cases all of which were caused by virulent staphylococci. The great value of the treatment lies in the prevention of the formation of large sequestra which results in the transformation of an acute into a chronic type of osteomyelitis.

The results of this conservative treatment have been so good that at the Surgical Clinic of Pisa where at first it was used only in the acute stage followed by operation it is now used through out the course of the disease until complete cure.

Leo V. C. Morgan M.D.

Dick G. F. Hunt L. W. and Ferry J. L. Calcification of the Supraspinatus Tendon A New Treatment *J. Am. Med. Ass. 1941 6 1*

The symptoms of calcification of the supraspinatus tendon are pain in the region of the apex of the shoulder joint muscular palsy varying degrees of limitation of abduction and rotation. Roentgen examination reveals shadows of varying density.

The part which trauma and focus of infection play in the etiology is discussed and a new treatment is

proposed. This consists of (1) large doses of ammonium chloride (2) rest of the diseased part (3) physical therapy and (4) elimination of foci of infection. The rest was obtained by means of a sling by day and pillows by night. Physical therapy in the main consisted of the use of the inductotherm. In one of the authors' patients there was an increase of pain after removal of an abscessed tooth. In other patients apparently complete recovery occurred in spite of definite foci which remained untreated. Five cases are reported in all of which clinical recovery occurred as well as disappearance of the deposits seen with the roentgen rays. All of the patients were given 4 gm. of ammonium chloride daily and 1 was placed on a ketogenic diet. The duration of treatment with the ammonium chloride is not definitely stated. The authors state that the beneficial effect of ammonium chloride is due to the lowering of the hydrogen ion concentration of the blood. The blood carbon dioxide values in one patient seemed to indicate a mild acidosis.

Hawthorn, E. C. Wallace M.D.

Finck J. F. on Tuberculosis of the Spine and its Cure (Die Wirbelsäulen-tuberculose) *Hilf. Stuttgart Ferdinand F. K. 1940*

The author presents the results obtained in the German Institute for Spinal Tuberculosis in Miltzsch which was founded by him in 1927. He is convinced that all patients suffering with spondylar disease should be gathered together in one hospital where the nursing and the entire habitus of the institution is designed for the treatment of this one disease. It is because of this and as a result of the logically founded careful and methodical procedure that one of the most serious and hitherto regarded as incurable diseases of mankind can be cured completely. The cure however rests upon the recognition of the significance of absolute muscular rest as one of the strongest biological healing factors, a factor which the author employs in the treatment of spondylitis by means of the most thorough and widespread flattening of the body from the top of the head to the toe. The effectiveness of this immobilization rests not only upon mechanical principles such as the prevention of the transmission of the movements of respiration to the vertebral column but also upon the fact that those muscles of which the action is not of importance for the maintenance of life are prevented from coming into the emergency necessary for the fight against the exciting causes of tuberculosis and thus these energies are placed at the complete disposal of the body. However it is of great importance also to carry through the treatment to complete healing of the tuberculous foci. In this respect one must free himself from the erroneous idea of immunization and try to eliminate the temptations of employing a means which would

specific cure for tuberculosis, because tuberculosis is not a generalized disease similar to an acute infection, but rather a disease of the tissue and the tubercle bacillus is a tissue parasite. The goal must necessarily be to maintain all curable patients in healing institutes up to the time of a definite cure and to institutionalize all those who are incurable.

Within the realm of a short review it is impossible to go into greater detail concerning the discussions of pathogenesis, pathology, symptomatology, and clear discussions upon decades of research and experience and they are elucidated throughout by exceptionally excellent and characteristic illustrations. It is of value, however, to study these chapters in detail because they are capable of elucidating many still moot questions, and they contain thoughts and the generally accepted conceptions, are, nevertheless, almost always well founded and based on critical thought. Thus, for example, the primary disease of the intervertebral disc as the etiological focus of the tuberculosis of the vertebral bodies is discussed, as well as the mechanical development of gibbus and buckling, and the formation of saggitation abscess and its dependency upon the tissues surrounding the spinal column, a fact which may, for example, result in the prevention of thoracic abscesses from wandering further because they are stopped by the connective tissue which has been stimulated to form granulations whereas cervical and lumbar abscesses may push directly into the muscle interstices. The size of the abscess *per se*, therefore, has no prognostic significance, rather, only the length of the traversed distance and the resulting involvement of other organs. The widely accepted opinion that pus which has become thickened and gruel-like in consistency, as the result of the admixture of caseous masses, is the more favorable one, is false. Tuberculous pus always becomes thinner in consistency and more clear before it completely disappears.

According to the experience of the author, spondylitic paralyses are primarily caused by pressure resulting from callus masses and peridural connective tissue proliferations which develop during the stage of regeneration. Their ultimate cause is not pressure injury but circulatory disturbance. Cord tissue which is only compressed but not involved by myelitis remains capable of restitution even after the compression has existed for a long period. Very important also are the discussions concerning clinically latent tuberculosis of the spine. In the lumbosacral region, in the absence of gibbus and in cases of isolated involvement of the fifth lumbar vertebra, a lordosis may lead to a mistaken diagnosis, just as in malum suboccipitale, these conditions have in common the gliding upon anatomically pre-formed gliding surfaces, and the author proposes the term "Malum vertebrae supra-sacrale." Many a case of spondylolisthesis apparently belongs to this group since the total atrophy of the intervertebral disc, which is observed in these cases, possibly rests

only upon local destructive inflammatory processes. The author also gives a learned presentation of the symptomatology and diagnosis in which he particularly warns of neglect of the general systemic examination. The most exact directions and advice for testing of the motility and the elicitation of pressure and impact pain are given, and with respect to paralysis, directions are given for careful observation of mild paretic or spastic phenomena and reflex anomalies especially as far as their differential diagnostic importance is concerned. All is convincingly presented on the basis of subtle observation and examining technique.

The method of therapy in all of its phases is based upon the unconditional physiological rest of the entire body. An important part of this therapeutic method is the open air treatment, which, as is also customary in the treatment of tuberculosis of the bones elsewhere in the body, is carried out on rest porches upon which the patients are rolled out by means of specially constructed portable cots, and at night the patients are kept in sleeping chambers in which the temperature is at least 12 degrees R. An important part of the therapy is the attention to the psychological factor for the three to five-year-old children supervised play by trained kindergarten teachers, for the larger children basket weaving and instructions by teachers employed by the state, and for the women handwork is advised. The nutrition should consist of a mixed protein and high caloric diet. Fat is only a burden and the idea of a "fattening cure" should be abandoned.

Very original proposals for the prophylaxis of secondary relapses are made every patient in the institute receives daily on the fasting stomach an "iodine cocktail" (metallic iodine 1, potassium iodide 10, aqua distillata 100). Children receive 3 to 5, and adults 8 drops of this mixture in milk. This iodine prophylaxis is thought to have been the cause of the fact that the institution, since its existence, has not seen a single cold and only 8 cases of sore throat. In cases of bronchitis, intramuscular injections of ether are given, in gastric disturbances (also in summer diarrheas) xeroform is given per os (1 gm daily), and in smaller children this dose is divided in 2 or 3 parts. The resin mixture "Kleol," introduced and used by Finck since 1900, which is supposed to have a definitely germicidal action upon the skin bacteria and produce an "absolute sterility," is useful in preventing secondary infection of fistulas. In puncturing abscesses, one should not endeavor to aspirate the entire content but should remove only 30 to 50 c cm in order to avoid the excessive pressure which may lead to perforation.

The treatment is carried out with the well known plaster cast and the cotton cross used as a wedge in the lumbar region. The latter should be increased in height only gradually, and with the greatest care and caution. It is not extension but rather compression which is the effective factor, since the aim is not to increase the length of the spinal column but rather to shorten it. Above every thing else, care

must be taken to maintain the unconditional permanence of this pressure. Thus for example it must also be maintained while arranging the patient for solar radiation. The latter according to the author's opinion is not at all the panacea of tuberculosis and should be carried out with restraint not more than one hour daily. The decision as to the time for ending the horizontal position in the plaster cast and the application of a supporting corset is determined first and foremost by the general condition of the patient. In those cases in which under nourishment still dominates the clinical picture getting out of bed cannot be permitted because when tubercle bacilli are still active there can be no progress in healing. Furthermore when there is evidence of a re-establishment of growth which always a sign of healing the patient may be permitted out of bed.

The supporting corset must reach up to the head and have sharp edges at its upper end so that it will prevent the patient from supporting his head upon the surface. In this way it will cause the back muscles to remain under constant tension. Caudally the corset must be brought down far enough so that sitting which causes an increase in the kyphosis is made impossible. The Hessing corset is therefore not suitable for this purpose.

As long as wedge shaped vertebrae are still visible in the roentgenogram the tendency toward buckling is still great and the corset will have to be worn even if it should take years. It is only when the roentgen finding disappears that one may count upon a change of the vertebra to a rectangular form and it is only then that one may gradually do away with the corset. Only in those cases in which the reconstructive process is absent is spinal fusion indicated. The average duration of therapy was about one and one half years the shortest was eight months. Even the most severe forms of spondylitis resulted in cure (STEVENS) HARRY A. SALZMAN, M.D.

SURGERY OF THE BONES JOINTS MUSCLES TENDONS ETC

Henschen C. The Treatment of Paget's Osteitis Deformans (D. Behandlung der Osteitis deformans Paget) *Schweizer med. Wochenschr.* 94 915

The various theories regarding the origin of osteitis deformans are briefly discussed. The majority of the surgical clinicians consider Paget's disease a chronic testis inflammation with diminished inflammation symptoms according to Roessle's interpretation. There are several clinical manifestations in Paget's disease which prove that figuratively speaking a concealed inflammation smolders within the bone. They are local hyperthermia within the Paget area, increase of osilometric readings occurring either by degrees or spontaneously, local perspiration, ostealgia. The roentgenogram shows a tendency toward the formation of detached sterile sequestra, a tendency to sclerosis in the cured area, malacia and lack of bone substance from overactivity in the surrounding

area of the affected bone which is undergoing a precipitated transformation with resulting sensitivity when used.

The author discusses in detail all possible cases which may present themselves for treatment. In cases of the cerebral type of this disease the following symptoms are apparent: (a) general cerebral pressure, (b) circumscribed manifestations of either cerebral stimulation or deficiency, (c) disturbances of the cerebellum, (d) cerebellar manifestations, (e) disorders of the hypothalamus, (f) narrowing of the ocular canal, (g) trigeminal neuralgia, and (h) oral disorder and disturbance of the equilibrium. Clinical types are classified as follows: the craniofacial, the clavicular, the thoracic and the pelvic. The latter in particular is linked with modifications of the hip joint and its respective disorders—neuralgia and rectal and urethral compression. Furthermore there is a spinal type which may result in pressure upon the spinal medulla. The common leg type involves either the entire leg or only the upper leg or tibia. In these cases static bending and particularly fractures as well as a tendency toward the development of sarcoma must be emphasized.

General treatment is directed toward: (1) influencing the bone disease through adequate diet (calcium and vitamins), Vitamin D is not recommended on account of the danger of calcium metastasis, (2) insulin treatment with simultaneous regulation of the carbohydrate intake, (3) venesection transfusions, (4) autovaccination, (5) heliotherapy, (6) parathormone therapy, (7) the administration of preparations from parathyroid cortex, (8) experimental antiluetic treatment, (9) the treatment of arterio sclerosis associated with Paget's disease and (10) the treatment with sodium fluoride which is said to influence the phosphatase. Some authors urge roentgen therapy. It should be emphasized however that Paget's sarcomas have almost always proved to be refractory to irradiation.

Special attention is given to the investigation of surgical measures. First of all an operation for the elimination of pressure in the region of the cerebral nerves is considered. Trigeminal neuralgia can be treated successfully by means of electrocoagulation. The acoustic and optic nerves can be relieved of pressure by the use of the canal operation according to Schloffe. Operative intervention with a cerebral region is impaired by pressure requires unilateral or bilateral trephining under certain circumstances. Complete trephining of the calvarium by means of a circular craniotomy may come into consideration. In case of pressure on the spinal cord laminectomy may be helpful. However the author demands in addition to relief of the pressure upon the spinal cord the insertion of an inner support (an ankylosis or Albee's operation). Malocclusive treatment is used for Paget's fractures. In cases of malocclusion osteotomy is resorted to for further improvement. Excessive longitudinal growth is treated with osteotomy for the purpose of shortening the bone. A new method suggested by Henschen is a partial

resection of the affected bone. He has frequently chiseled off the medial anterior layer of the tibia from one metaphysis to the other, he has made a wide trephining space at the upper femoral end and has removed the exterior of the cranium. He believes that this operation makes possible a self-cleaning process of the diseased bone in case of post-operative inflammation, and that the excessive pressure in the medullar cavity may be decreased.

Regarding Paget's sarcoma, Henschen is of the opinion that it is of multicentric origin. He believes that by the use of filtered tissue extracts from the principal growth center of the affected bone, a bone sarcoma may be induced in an animal with a tendency toward sarcoma. Operation on the parathyroids is ineffective both in the fully developed and in the preliminary stage of Paget's disease.

(HELLNER) HILDA H. WHIFLER

Finocchio, R., and Uriburu, J. V. Tuberculosis of the Elbow. Operative Treatment and Technique of Economical Resection with Arthrodesis (Codo Tuberculosis. Tratamiento operatorio y técnica de la resección económica con artrodesis). *Dia med*, 1941, 13: 202.

Tuberculous osteo-arthritis of the elbow in children generally heals with immobilization; occasionally a surgical procedure is necessary. In the adult the problem changes; some authors employ non-operative procedures, but the majority frankly recommend operation.

González, Aguilar, and others have established the selection of treatment of osteoarticular tuberculosis according to the allergic period of the infection, according to the ideas of Ranke. The child generally shows an articular lesion in the second period, but occasionally one can find lesions which develop during the third period. In adults one commonly finds lesions during the third period, or the stage of relative immunity. The disease develops into a chronic process without any tendency toward healing.

The osteoarticular lesions of the second period must not be operated upon, but those which develop during the third period should receive surgical treatment. These modern conceptions justify in a certain way the classical formula "Conservative treatment in children; resection in adults." An operation performed during the second period may end in disaster, dissemination and death. The clinical findings help to distinguish the second from the third period because in the second period there are strong exudative perifocal reactions, with general involvement of a violent character; it is an evolutionary state. On the other hand, in the third period the general symptoms disappear and local lesions dominate.

Surgeons do not agree on the treatment of tuberculosis of the elbow in adults; some prefer clinical treatment, some surgical treatment, and some that treatment which to them best suits the individual case. To-day, the treatment by exclusive orthopedic procedure is very seldom followed.

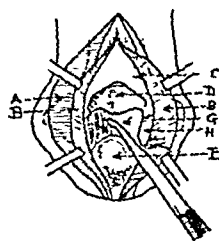


Fig 1

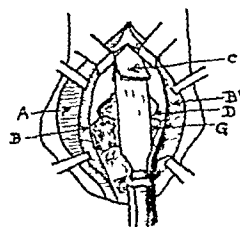


Fig 2

Its use is indicated only in very benign cases which are not suitable for the operation.

The authors believe that many of the so-called complete healings by simple immobilization hide a tuberculous granuloma which has been choked by the fibrous reaction, but is always ready to become active on the slightest trauma or movement. The pseudo-ankylosis of such an elbow still shows imperceptible movements because tuberculous joints never undergo spontaneous bone ankylosis. This is true especially of the elbow, which is the worst joint for successful arthrodesis. For this reason the authors insist that every tuberculous osteo-arthritis in adults who are in the proper allergic period must be operated upon. The surgeon can perform a typi-

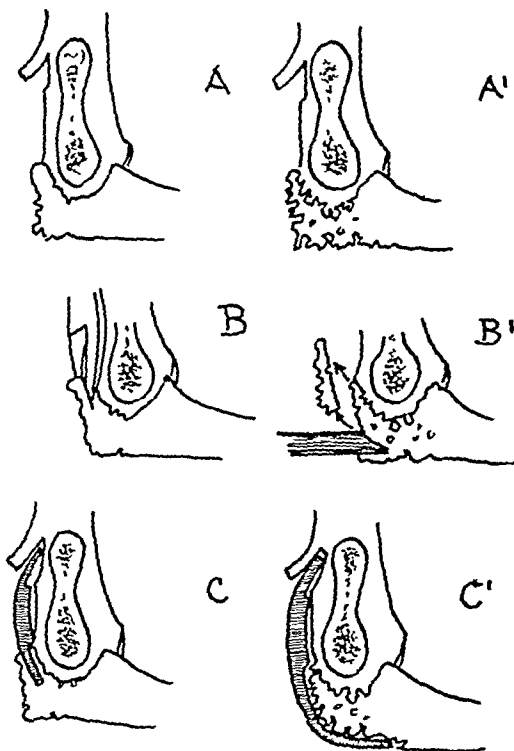


Fig 3

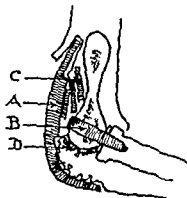


Fig 4 A graft B olecranon C chips in fossa olecrani D chips in cubital articulation

cal resection which produces the mobility of the joint or an operation which produces ankylosis. The authors prefer the last especially the economical resection with arthrodesis. The classical resection is not recommended one is never sure that all of the diseased parts have been removed and there is always the danger of leaving some of them with a movable joint. It is a questionable procedure which does not exclude the possibility of shortening and the mobility of the joint is far from perfect.

Arthrodesis produces healing through suppression of the articular function. Extra articular arthrodesis is an excellent procedure in joints of difficult interarticular approach. The elbow can easily be opened and economically resected. Therefore the authors perform external arthrodesis with resection.

Chutro some years ago said that the surgical treatment of osteoarticular tuberculosis is not an attempt to eliminate all of the diseased tissues of the joints but to obtain osseous ankylosis to bring about the slow disappearance of the lymphoid tissue and as a result remove the cicatrization of the neighboring foci.

Total suppression of the focus is almost impossible. Extirpation of the synovial membranes is accomplished when possible the cartilage is taken out but the ligaments are preserved. This favors a perfect reciprocal contact of the surfaces of the joint immediately after the operation.

For many years Ricardo Finocchetto performed the operation with the following technique: economical resection of the elbow joint with synovectomy and intra articular and extra articular arthrodesis. He prefers a nit graft which can be taken easily and adapted readily to the proper shape and which provides a good number of chips.

The operation begins by taking the graft from the fifth or sixth rib. It should always be larger than necessary so as to furnish the chips.

Local anesthesia of the rib is secured with 0.5 cc of 1% procaine. The incisions are

made according to Figs 1, 2 and 3. The incision (Fig 1) begins 6 cm above and ends 6 cm below the tip of the olecranon.

The cutaneous flap is dissected just enough to expose the medial part of the olecranon. With proper care for the ulnar nerve the deep tissues are incised. With a periosteal elevator or dissecting knife the olecranon is freed and the joint is opened. Then follows the extirpation of the synovial membrane and of the cartilage with small curettes of the J. J. type (Fig 2). To receive the proximal end of the graft the triceps must be dissected upward just above the fossa olecrani. An osteoperiosteal flap is lifted with a chisel so that its hinge lies 2 cm above the limit of the fossa (Fig 2). The bed of the olecranon can be made in two ways if the lesions are not very important one can chisel a groove which receives the graft with extensive lesions the whole posterior surface of the olecranon is freshened and the graft is held in place by the fibrovascular suture (Fig 3).

The proximal part of the graft is introduced under the humeral bone flap then some bone chips are added to bridge the humerus and the olecranon and are placed in the fossa olecrani. The radioulnar joint must be immobilized with some chips or a bone nail (Fig 4). The operation ends with the placement of the roller end of the graft and the proper suture of the deep tissues and the skin. The joint is kept immobilized for one year. HECTOR MARINO MD.

FRACTURES AND DISLOCATIONS

Thompson G. C. V. Paralysis of the Serratus Anterior Muscle Complicating Dislocation of the Shoulder. *U. S. J. A.* 1931, 1, 237.

The author stresses the need for a careful routine examination of all patients with dislocation of the shoulder to determine the functional integrity of the brachial plexus. While the axillary nerve is liable to injury because of its exposed course one may be able to demonstrate minor grades of paralysis in other muscles about the shoulder. The author reports isolated paralysis of the serratus anterior muscle from contusion of the long thoracic nerve of B. J. This complication is most likely to occur if the head of the humerus passes into the subclavicular position by sliding under the coracohumeral muscle. With paralysis of the serratus anterior muscle the vertebral border and the angle of the scapula become more prominent the spine becomes more horizontal and the lower angle comes near the middle. This winging appearance is usually quite obvious but disappears on flexion of the forearm. The patient is unable to raise the arm high than the horizontal plane in front of the body and weakness of the shoulder movements particularly obvious when the arm attempts to push forward. Isolated paralysis of the serratus anterior muscle is very rare and a careful examination of the triceps, biceps and other shoulder muscles should be made before it is assumed that the paralysis is an isolated one.

In the treatment it is most important to keep the serratus muscle relaxed for from three to six months and then toned up by massage and electrical stimulation. The author recommends a cloverleaf sling of Foucar, a threefold loop of webbing encircling the wrist of the affected side and the patient's neck and passing under the opposite axilla, which uses the center of the opposite clavicle as a fulcrum around which the scapula is derotated. When, however, the paralysis of this muscle is permanent, muscle-transplant operations in which the lower part of the pectoralis major muscle is detached from the humerus and inserted into the lower angle of the scapula are advised. However, as the nerve lesion in such a case as the author reports is a contusion only, regeneration should be complete and operative procedures should not be found necessary.

PAUL C. COLONNA, M.D.

Bertola, V. J., and Ordóñez Ferreyra, H. Treatment of Fracture of the Patella (Tratamiento de la fractura de la rótula) *Bol. y trab. soc. de cirug. de Córdoba*, 1940, 1: 35.

The authors give an anatomical and embryological discussion of the patella, stating that the most important thing in maintaining the function of the leg after fracture of this bone is not the healing of the fragments of the patella but the maintenance of the normal position and function of the extensor muscles. This is illustrated by roentgenograms, photographs, and a diagrammatic sketch in a case of fracture in a young man who fell in a football game with the knee in semiflexion. He came for treatment fifteen days after the accident.

The authors criticize the method of cerclage, which is in common use in the treatment of such fractures. In addition to causing failure of union on account of the formation of fibrous callus, it reduces the degree of flexion, and produces a rarefying patellitis due to the action of the foreign body, a painful periartthritis, and a fixation of the patella to the femur, all of which cause great functional incapacity.

The method of treatment which the authors recommend is simple and can be carried out by any skillful surgeon. It includes careful and anatomically accurate repair of the extensor muscles and secondary suture of the patella. Absorbable suture material is used. No irritating body is left in contact with the joint. The leg is then put in a Boehler's plaster stocking with the bone protuberances carefully padded with cotton. The patient begins to walk the second week and the cast is kept on for seven weeks. This method is based on an understanding of the physiopathology of rupture of the extensor muscles of the leg. The functional treatment consists of active mobilization, massage of the quadriceps muscle, mobilization of the patella, and Bier's baking, which facilitates the task. Supplementary medication, such as vitamins and calcium, may be given to the patient.

AUDREY G. MORGAN, M.D.

Rosbach, A. F. The Treatment of Fractures of the Lower Leg, with Special Attention to Boehler's Method (Die Behandlung der Unterschenkelbrüche unter besonderer Berücksichtigung der Boehlerschen Methode) Frankfurt Dissertation, 1939.

The author presents a historical review of the operative treatment of fractures, and emphasizes the newer developments, especially those of Fritz Koenig. He mentions the use of Lane and Lambotte plates, wires, Parham bands, bone sutures, nails, screws, and, lastly, autoplasmic transplantation. In contrast to this he describes the influence of various men such as Steinmann, Klapp, and Kirschner, and he emphasizes the fine work of Boehler, who combines functional treatment with the use of traction and has given especial prominence to the unpadded cast. The Florken clinic has used the method of Boehler since 1930. Fractures in the lower third of the lower limb without displacement or with only slight displacement are treated immediately with an unpadded cast. Fractures with much displacement and swelling are manually reduced as much as possible and then immobilized on a Cramer splint for from six to eight days. Then under spinal anesthesia, skeletal traction with a wire is used. With the leg lying in a Boehler splint and the knee bent at a right angle a pull of 20 kgm. is sufficient to correct the worst displacement and distortion. As soon as the displacement is corrected the weight is reduced to from 10 to 15 kgm. An unpadded posterior splint is then laid from the knee to the tips of the toes. Gauze bandage is wrapped around the limb from the knee to the ankle joint. At the heel the splint must be cut on both sides, the corners laid over one another, polished, and smoothed. The gauze bandage is then continued further to the toes and three circular rolls of plaster are laid over all. The leg lies on the splint in semiflexion. With a pull of about 3 kgm. the foot hangs from the crossbar of the splint. This dressing is used for about three or four weeks or with a more serious comminuted break for about five or six weeks. Then a new plaster is applied, still under extension, it reaches to the middle of the thigh. After union has begun the extension is removed and a walking iron incorporated in the plaster. When this fracture is united the bandage is changed for one below the knee only. About twelve weeks after the reduction the leg is wrapped in an Unna's paste bandage. This should be worn for half a year, being renewed every four weeks. Young people can resume heavy work after three or four months, older people after from four to six months. The Dohler transfixion method, which requires 3 nails has been used only a few times by the author. With compound fractures the clinic proceeds differently. After operative care of the wound the limb is laid on a splint with a pull of 3 kgm. on a wire introduced through the heel. The pull should be increased to from 5 to 10 kgm. The traction dressing remains from two to six months. Fractures of the shaft of the fibula are treated for four or five

weeks with an Unna's paste dressing and a coating of plaster of Paris. The patient can then move about.

The author then compares the statistics of 25 authors for the earlier years from 1894 to 1936. These show great differences. First in respect to the hospital stay, Wettstein reports seventy-five days as the average for complicated and uncomplicated fractures. Wiener and Wettcher give eighty days for closed and one hundred and thirty-eight days for open breaks. Second, the duration of full disability ranged from one hundred to three hundred and forty-nine days for closed fractures. Third, the percentage of disability for closed fractures ranged with different authors from 0-3-25 and 43-5 per cent to even 93-7 per cent, while Lundgren who gave statistics on 389 cases from the year 1936 reported the disability as only 16-2 per cent. For compound fractures the percentages ranged from 42-5 and 44-4 per cent to 67-4 per cent.

The author then reports on fractures of the lower leg from the Flörken clinic observed during the period from 1921 to 1937. These cases amounted to 92 per cent of the total, but only 25 patients answered his questionnaire. From 1921 to 1929 the padded cast was used, sometimes with nail and wire extension, and on definite indications 16-4 per cent

of the patients were operated upon. Three of them died, 2 from traumatic brain hemorrhage and 1 from bronchopneumonia after amputation. Two pseudarthroses were healed by means of Beck's drilling. Fifty-two cases (that is 50 per cent) were treated by means of Kirschner's wire traction. Operative treatment was never used immediately.

The duration of confinement to bed was reduced with the Boehler treatment by 36-6 per cent. The time of healing and the absence from work were both reduced by the decreased confinement to bed. Stay in the clinic dropped from sixty-two and seven tenths days to forty-seven and three tenths days—a reduction of about 24-5 per cent. Duration of the disability could not be compared because of the length of time elapsing between the two groups of cases compared, but it must be noted that since the adoption of the Boehler treatment only 1 patient drew compensation amounting to over 50 per cent, namely 33-3 per cent. Furthermore, if the results in the two groups are classified as very good, good, indifferent, and poor, the advantage is very much with the Boehler treatment. In addition, the result with the Boehler treatment became better year by year as it was used.

(FRNZ) HAWT OR E C WALLACE, M.D.

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Ghitzescu, C I., and Roback, J. The Nutrition of the Arterial Wall. A Normal and Pathological Study of the Histophysiology in Relation to Surgical Treatment and to the Pathogenesis of Arterial Diseases (Die Ernährung der Arterienwände. Normales und pathologisches Studium der Histophysologie im Verhaeltnis zur chirurgischen Behandlung und zur Pathogenese der Arterienkrankheiten) *Arch f klin Chir*, 1949, 199 394

The authors attempt to study the structure of the arteries from the standpoint of the functional demands upon them. They concern themselves, therefore, particularly with the manner in which the arterial wall receives its nutrition. The various vascular layers are permeated with two nutritional streams of unequal significance. The first flows through the vasa vasorum and supplies the adventitia and outer muscle layer. The rest of the vessel wall is nourished from the vascular lumen, by diffusion.

Under pathological conditions, the degree and extent of vascular damage is determined by the manner in which the artery wall is nourished. The adventitia also possesses lymph capillaries, whereas the endartery and muscular layer discharge their excretory products into the interstitial or lacunar lymph. Obstructions to the lymph flow explain many peculiarities of the pathological changes in a vessel wall. Lymph stasis or obstruction of the return circulation of the nourishing plasma plays a significant role in the formation of edema of the artery wall. On its basis, the various degenerations of the arteries such as fatty infiltration arise.

(SUNDER-PLESSMAN) LEO M. ZIMMERMAN, M.D.

BLOOD, TRANSFUSION

Lenggenhager, K. A Solution of the Problem of Blood Restoration (Eine praktische Loesung des Blutersatzes) *Zentralbl f Chir*, 1949, p 1961

The ideal substitute for blood is fresh homologous blood. The effect of all other substitutes such as saline, glucose, or Ringer's solution, is very transitory. In from fifteen minutes to one hour, 50 per cent, and after two hours, from 80 to 90 per cent of the solution has disappeared from the circulation regardless of the amount infused. Agents introduced to prolong the effect by increasing the colloid osmotic pressure, such as an 8 per cent solution of vegetable gum arabic, act as foreign bodies and easily produce shock. According to studies made by the writer, the erythrocytes show very marked agglutination. The disadvantages of stored whole blood are:

1. Instability—the blood keeps only for two or three weeks when stored by the citrate-glucose method. If stored according to the thiosulfate method of Corelli, it will keep for six weeks, but experiences with large transfusions are lacking.

2. It must be preserved at low temperatures, from 2 to 4 degrees.

3. Tests with specimens preserved for more than fourteen days show frequent fever and chills.

4. Sterility tests are required.

5. Transportation requires care.

Studies made by Schoercher have shown that the presence of erythrocytes as oxygen carriers is unnecessary, and that exsanguination results from inadequate filling of the blood vessels. Acute hemorrhage with loss of 30 per cent of the blood volume usually caused death of the animal and loss of 50 per cent of the blood volume always caused death of the animal. If the circulatory tract is filled with serum or plasma, the animals tolerate a blood loss which leaves from only 10 to 15 per cent hemoglobin and if filled with telfosun only 35 per cent. That the erythrocytes do not cause the chief disturbance resulting from loss of blood is evident also from the fact that in human subjects a hemoglobin level of less than 60 per cent can hardly be tolerated, whereas patients with chronic anemia may survive with hemoglobin levels as low as 12 per cent.

As a proof of the value of sudden filling alone, the author reports a case of cut throat with injury of one carotid artery. After a few minutes, the bloodless, unconscious patient, whose wound was no longer bleeding, was given an intravenous infusion of 1.2 liters of telfosun. Following the injection of this amount, a jet of blood as thick as a finger issued from the external carotid ligature. The patient regained consciousness and subsequently received a blood transfusion.

Serum, plasma, and ascites fluid are protein solutions which undergo autolytic changes on preservation. For this reason dried serum has been recommended. Riguchi had good results with dried serum, the erythrocytes being included and centrifuged off following dilution with glucose, Ringer's or telfosun solution. Schoercher utilized a dried serum (only in animal experiments) produced by alcohol precipitation of serum protein. The disadvantage of both methods lies in the fact that the powder is not completely soluble. Lenggenhager has now prepared a dried human serum which is easily soluble when $\frac{1}{2}$ to 1 volume of water is added to the original volume of serum. He obtained this serum by adding 7.7 gm of glucose solution to every 100 c cm of serum. This dissolved glucose-dried serum withstands boiling but is positive to most other protein tests. After animal experimentation he tried gradually increasing intravenous infusions up to 300 and 650 c cm in 33 human subjects. There is no necessity for consideration of the blood groups as the agglutinins and hemolysins are destroyed by the boiling. Nor is a Wassermann test necessary. The author observed no subjective disturbances and of prime importance is the fact that this serum was re-

tained for a long period in the circulation as demonstrated by his coworker Wapf. Usually it takes three days for the fluid volume to be regained after a severe blood loss because the influx of tissue fluids into the circulation begins to exert an effect only from four to six hours after the hemorrhage. As the serum remains in the circulation for from eight to eleven hours this period is bridged over during which the body is as yet incapable of making full compensation. As all other blood substitutes disappear from the circulation after two hours their effect can be only transitory. It is also of importance to note that this dissolved dried serum produces no anaphylaxis. After animal experiment the author made careful experiments in patients with inoperable cancer. He never observed any symptom of hypersensibility even when a second infusion of from 400 to 600 c. cm. was made three or four weeks after the first. He then made experiment with the dried sera of oxen, hogs and horses. Also these can be rendered wholly fluid by the addition of 10 gm. of glucose to 100 c. cm. of serum and when diluted with double this volume (as compared with the original serum volume) the fluid can be boiled without precipitation. The author also tried this dried serum in inoperable cancer patients and infused from 300 to 650 c. cm. intravenously without signs of intolerance. Repeated injections failed to produce serum exanthema and anaphylactic symptoms. In only 4 patients who received an animal serum mixture in which errors of technique were discovered (too heavy a film, too slow drying, chill and fever of 39

degrees developed six hours after the injection but had disappeared by the next day. This was the result of bacterial toxins as the bacteria had been destroyed by boiling.

An interesting observation was made in one of these cases. The patient was suffering from multiple tuberculous abscesses of the soft tissues of the bovine type. These had been punctured every third day for three weeks. Following the injection of the animal serum the abscesses did not refill.

The advantages of such dried animal serum include (1) an inexhaustible supply (2) donors can be dispensed with (3) easy transportation and (4) sterility. It can furthermore be utilized as a blood substitute in all diseases associated with hypofunction of the circulation as a substitute for proteins in cases of extensive protein loss (empyema with daily excretion of from 200 to 500 c. cm. of pus) and as a nutrient following operations made on the intestinal tract.

After testing the method on 55 patients in quantities of from 300 to 650 c. cm. the writer turned it over to the Ciba Company of Basel who now supply a dried ox serum. If excessive quantities have been dissolved the sterile solution can be preserved for months without change and should not be boiled before being used again as this would cause a caramelization process. Such a serum would produce shock (contraction of heat in the head, tremors, sacral drawing pain, dyspnea and frequently sudden urticaria) even in quantities of 50 c. cm.

(FRANZ) EDITH SCHLACHTE MOORE.

SURGICAL TECHNIQUE

WAR SURGERY

Mitchner, P. H. General Principles of Treatment of Air-Raid Casualties *Brit M J*, 1941, 1 309

Mitchner states that the number of casualties from air raids has been smaller than anticipated. Though the proportion of killed to wounded is high (1 to 2), the vast majority of those wounded suffer from very slight multiple wounds requiring no surgical intervention, while of the seriously injured many are too ill to be helped by surgical skill.

First-aid squads are cautioned against unnecessarily elaborate dressings and splints, and too long exposure of patients to cold and collapse by keeping them undressed. They should remember that arrest of hemorrhage with pad and bandage, and splintage of fractures are all that it is desirable to achieve, in order that the victim may be conveyed quickly to the warmth and cover of a hospital. Squads should be trained to work in the dark, or by candle or electric torch, and they should be able to carry out their work in a gas mask.

All cases should go to a hospital receiving room and there be seen and carefully sorted by an experienced medical practitioner or surgeon, and for this to be done efficiently some system of colored tabs is essential, so as to insure precedence for cases of hemorrhage, open chest wounds, and burns. The value of team work in insuring the maximum of efficiency in the minimum of time, so as to avoid a block during the rush of casualties, is emphasized. Wound shock needs treatment early, and the severe cases may need serum, plasma, or blood transfusion, in addition to the usual treatment. Rest after treatment and before evacuation is essential in shock cases.

Bomb wounds, if bad, lead to fatal results either directly or from their severity, the majority take the form of peppering with small or medium-sized fragments. Such wounds must be carefully examined to ascertain that no body cavity has been penetrated, and if any doubt exists the wound must be excised and explored; otherwise the wound must be cleansed thoroughly and dressed. No redressing should be carried out for at least ten to fourteen days, when, in most cases, healing will be found to have taken place. Mitchner advises giving sulfanilamide as a prophylactic against sepsis for the first four or five days. Glass wounds may penetrate deeply and do as much visceral damage as bomb fragments.

Fractures are mostly compound and must be dealt with by free excision of the wound and fixation of the limb either with plaster-of-Paris or traction. Results are good with immediate plaster-of-Paris dressing if the patient can be kept under observation for some days where the operation has been performed. Danger lies in infection and edema under the plaster, which cause gangrene of the limb. As a general rule,

for first aid, all fractures of the lower limb should be put in a Thomas splint, and those of the upper extremity should be treated by splinting and binding to the trunk for transportation. In the event of open pneumothorax, a large pad and tight bandage must be applied at once, and the patient must be removed to the hospital immediately where very early operation is undertaken to cleanse the thoracic cavity and close the chest wall; such steps should precede any attempts at resuscitation. Hemothorax is best treated conservatively unless there is cyanosis, restlessness, and respiratory distress, when aspirations are indicated. Should subsequent infection ensue, operative intervention will be carried out. Perineal and buttock wounds should be regarded with grave suspicion and the abdominal cavity opened if any doubt is entertained that it may be perforated.

Burns may be so severe as to be fatal. With the wide choice of methods of dressing burns available, tanning gives the best results and is most generally applicable. Attending shock and hemoconcentration require early plasma or blood transfusion. The fluid must be transfused slowly to avoid pulmonary edema, for which reason intravenous saline solution is never given. Prompt tanning as a first-aid measure, with tea or tannafax compresses, and without previous cleaning, has resulted in less collapse and subsequently better fits the patient for surgery. At the hospital, after treatment of the shock, surgical cleansing to 6 in. beyond the skin edges, with opening of all blebs, is important. After the dressing, it is advisable to give sulfanilamide for four or five days because of the great tendency toward sepsis, and if the patient is vomiting it can be injected. Local sulfonamide packs for burns of the face and perineum are being advocated by some workers. Toxic effects, especially leucopenia, must be watched for with sulfonamide drugs. EDWIN J. PULASKI, M.D.

Zuckerman, S., Hadfield, G., O'Reilly, J. N., Alston, J. M., and Others. The Problem of Blast Injuries. *Proc Roy Soc Med*, Lond., 1941, 34 171

In this article the problem of blast injuries is discussed as follows:

ZUCKERMAN. Without causing external injury, the blast of high explosive may cause hemorrhagic lesions in various internal organs of experimental animals. The most conspicuous lesions are found in the lungs, where they vary according to the pressures to which the animals are subjected from small superficial hemorrhages to hemorrhages which affect the entire substance of the organs. Hemorrhagic lesions have also been observed in the pericardium and epicardium, the thymus, the liver, spleen, intestine, kidney, adrenal glands, bladder, and uterus. Hemorrhagic lesions have also been observed in the upper part of the trachea. Hemorrhages around spinal roots, especially in the thoracic region, are constant,

and pial and ventricular hemorrhages on and in the brain are occasional at high pressures. Rupture of the ear drums has also been observed at high pressures.

Experiment has shown that the thoracic and abdominal lesions are due to the impact on the body wall of the pressure component of the blast wave and not to any effect of the suction wave acting directly through the upper respiratory passages. The pulmonary lesions directly due to blast are thus comparable to some extent with hemorrhagic lesions which may occur as a result of severe falls or direct blows on the chest wall.

In air raids people are exposed not only to the direct effects of blast but also to indirect effects such as violent displacement and the impact of falling or flying masonry both of which may lead to pulmonary hemorrhages. Observation has shown that the direct effects will be experienced only close to the explosion. Case histories are analyzed and it is suggested that before diagnosis of internal injuries directly due to blast are made attention should be paid to the possibility of internal injury due to indirect blast effects.

HADFIELD discussed the findings in 30 cases in which post mortem examinations were done. In 27 cases multiple bilateral pulmonary hemorrhages were found with little or no significant injury to the thoracic wall. With regard to the pulmonary hemorrhages there was no essential difference between the human lesions in these cases and the lesions produced experimentally by Zuckerman. Hadfield found in the human cases that the hemorrhages were frequently deep in the lung and occasionally gave relatively little indication on the surface that they were so extensive below. Section taken through the hemorrhagic areas showed that the blood lies almost exclusively in the alveoli and there was marked disproportion between the amount of blood in the alveoli and the relatively slight damage to the alveolar walls themselves. It was also noteworthy that the amount of hemorrhage into the lung in fatal cases varied within very wide limits. The discussant felt that capillary rupture did not account for all the capillary bleeding but suggested that the clinical manifestation might be due to widespread and general capillary dilatation.

O'REILLY continuing the discussion observed clinically that several individuals with blast injury subsequently developed lobar pneumonia with recovery after the administration of sulfapyridine. In 5 other cases all the symptoms of acute abdominal catastrophe were manifest. In abdominal section was performed but nothing was found save minute subserous hemorrhages.

In closing the discussion ZUCKERMAN stated that without knowing in detail the circumstances under which casualties occurred it was impossible to say that the hemorrhagic lesions had been due to blast alone in air raid victims were due to blast alone. The question that had to be asked was: How much are they due to the direct action of blast and how much

to the effects of being thrown against a hard object or to the impact of machinery? J. M. MORA M.D.

Bywater F G L Beall D Belsey R H R
Miles J A R and Others Crush Injuries
with Impairment of Renal Function B I M
J 94 1 427 43 434 449

There have been 4 cases of crush injury of the limbs among air raid casualties which because of their general similarity in clinical course were thought to represent a specific and hitherto unreported syndrome. The picture presented is briefly as follows. The patient has been burned for several hours with pressure on a limb. On admission he looks in good condition except for swelling of the limb, some local anesthesia and whealing. The hemoglobin however is raised and a few hours later despite vasoconstriction made manifest by pallor, coldness and sweating the blood pressure falls. This is restored to pre-shock level by (often multiple) transfusions of serum plasma or occasionally blood. Anxiety may now arise concerning the circulation in the injured limb which may show diminution of arterial pulsation distally accompanied by all the changes indicative of gangrene. Signs of renal damage soon appear and progress even though the crushed limb be amputated. The urinary output is usually small, perhaps because of the severity of the shock diminishes further. The urine contains albumin and many dark brown or black granular casts. The late decrease in number. The patient is alternately drowsy and anxiously aware of the severity of his illness. Slight general edema, thirst and incessant vomiting develop and the blood pressure often remains slightly raised. The blood urea and potassium raised at an early stage become progressively high and death occurs comparatively suddenly frequently within a week. Autopsy reveals necrosis of muscle and general changes and casts containing brown pigment in the renal tubules.

In the 4 cases described there were some changes common to all and other individual changes. The renal lesion consists structurally of severe degenerative changes in the proximal convoluted tubules and more distally of brown pigmented casts of a color in unstained preparations similar to that of blood corpuscles. There are reactive changes around the casts and desquamated epithelium in the medulla (Figs 1 and 2). On histological grounds the matrix of the casts is thought to be composed not of red corpuscles but of desquamated epithelial cells. The pigment might either be accreted directly either by excretion into the lumen from the blood stream of hemoglobin, myoglobin or bile pigment or passively by the epithelium into the lumen of the tubules already pigmented.

Changes very similar to these are described following matched transfusion. The casts are not composed of red cells but sometimes the reaction of the body is resembling them. Similar casts containing hemoglobin have been noted in eclampsia. The

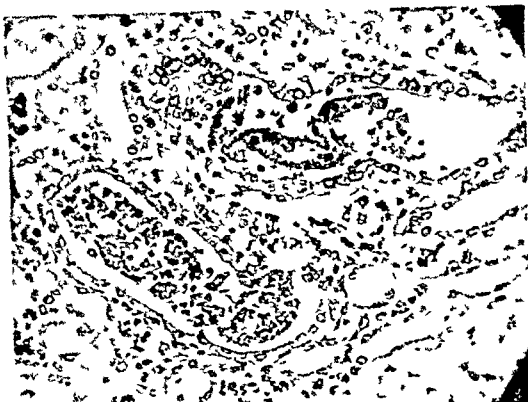


Fig 1 Photomicrograph of renal collecting tubules from medulla, stained hematoxylin and eosin, showing, above, ribbon like pigmented cast, and, below, similar cast invaded by polymorphs and surrounded by desquamated epithelial cells $\times 160$

effect on function of blockage by casts is obscure. There was no significant concentration of urea hence no selective absorption of water, and in Case I there was failure to reabsorb chloride when the blood level was below 500 mgm per 100 cc. Case II showed some degree of chloride reabsorption. There thus appears to be dysfunction of the convoluted tubules. Whether partial blockage or blockage of a few tubules can so raise the intrarenal pressure as to interfere with tubular function as well as with glomerular filtration is not known. It has been suggested that the degree of tubular blockage is not sufficient to account for the symptoms associated with "transfusion kidney." The hypertension noted in 2 cases, and also noted in the case reported by Mayon-White and Solandt may be allied to other types of primary "renal hypertension."

It is possible that minor degrees of this renal damage may occur, since at least 1 patient reported elsewhere with crushed limbs has been observed to recover completely with a raised blood urea and low urea clearance. In a similar case of muscle crush there was a definite tendency toward recovery of renal function, this was shown by the increasing reabsorption of both water and chloride. Certain cases of postoperative anuria may prove to fall into this category but the majority of them appear to be associated mainly with decreased blood volume and blood pressure, since restoration of blood volume to normal improves the renal output.

Muscle necrosis is the one etiological factor common to these cases and to those observed elsewhere. It is known that when muscle is injured its permeability increases and intracellular ions such as potassium leave it rapidly. This may be related to the early increase of serum potassium which has been noted. An evaluation of the relative importance of muscle injury, renal insufficiency and possibly

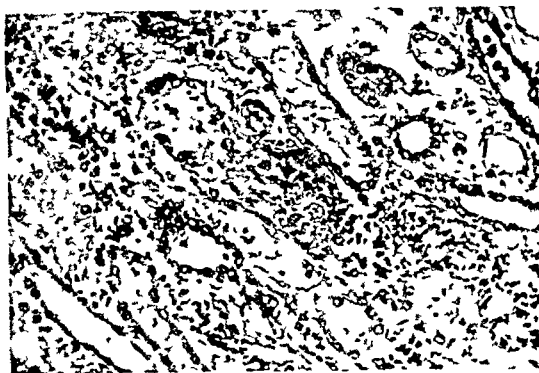


Fig 2 Photomicrograph of renal tubule from boundary zone, stained hematoxylin and eosin, showing necrosis of wall and commencing reactive changes $\times 132$

adrenal cortical deficiency in the composition of this biochemical picture must await further data.

Oliguria in shocked patients may be due to dehydration, sweating, and the fall in blood pressure, since a pressure below 75 mm Hg is insufficient to produce urine in the absence of circulating diuretic substance. The fall in blood pressure lasted for one and one and a half hours only in Cases I and II. Such oliguria facilitates the precipitation of relatively insoluble material in the tubules both in man (e.g. sulfapyridine calculi) and experimentally (e.g. hemoglobin). Another possible cause for anuria in air-raid casualties receiving sulfapyridine is the formation of calculi at the ureterovesical junction. None of these seemed to be of primary significance in the cases cited.

The part played by transfusion fluids must be considered, inasmuch as the pathological changes resemble closely those of the "transfusion kidney." There was no evidence clinically of a transfusion reaction, although such can occur in the absence of one or, rarely, all of such symptoms as rigor, chill, backache, and jaundice. Plasma samples taken at seventeen and a half and forty hours after transfusion showed no increased color. The most potent argument against their being due merely to transfusion reactions is that no such condition has occurred in any of 25 shocked and injured patients without severe muscle crush treated in the same hospital by blood or "serum" transfusion.

The treatment of this condition so far has been by trial and error. It has been directed primarily to restoring the urinary output by means of heat to the loins, saline dilution of plasma protein, increasing the blood volume with serum and hence increasing the blood pressure (also the glomerular capillary pressure), and the use of diuretics such as caffeine. Decapsulation should perhaps be tried, as it has been shown to reduce the intrarenal pressure (Winton, 1937). In transfusion kidney this has been done twice with successful results (Bancroft, 1925; Younge, 1936).

The effect of adrenal cortical extract in this condition should also be observed in view of the raised potassium. Prevention by early amputation was thought adequate in 1 case but thirty six hours was not early enough. Whether an alternative to immediate amputation exists shall be learned only by further and fuller investigation of such cases and by careful observation of the effects of treatment or if the condition can be reproduced in the laboratory.

BEALL BYWATERS BELSEY and MILLS report a case in which additional studies of the kidney were made. In frozen sections no trace of fat was found either in the tubules, cells or capillaries. These sections did however show that the pink material in the tubules and glomeruli filled the spaces more completely than it appeared to do in the paraffin sections. Many stains were tried in an attempt to identify the material in the tubules and glomeruli but without success apart from a positive stain for fibrin (Weigert's fibrin stain). The material giving a positive stain appeared only in the distal part of the tubules and never in the glomeruli in this kidney. The brown material did not give a positive reaction for free iron.

MAYON WHITE and SOLANDT reported the case of a patient who died from uræmia following a type of injury that often produces shock. Unlike similar cases reported no blood was given to the patient hence renal damage from incompatible blood was excluded as a cause.

The Medical Research Council reported 11 additional cases. All the patients were pinned under ether for a period between three and twenty six hours. In 6 fatal cases death occurred in from five to ten days. Hypertension, blood stained urine, oliguria and edema of the crushed limbs were the outstanding clinical features. In 3 of 5 patients who survived blood was found in the urine and in the 2 others without hematuria the urinary output rose to normal on the fifth and sixth days respectively. In 1 case without intravenous therapy the blood pressure rose to 176/110. In this group which survived the degree of swelling and the duration of crush differed little from the fatal cases.

In future cases particular attention should be paid to (1) the presence of anesthesia or whealing (2) edema its daily extent and progress on (circumference measurements) (3) the pulse in the limbs and if possible oscilometric readings (4) the blood pressure initial and daily readings (5) initial hemoglobin measurements and (6) chemistry of the blood (serum for potassium and urea) and (6) the urine daily attention from the time of entry should be given to the quantity, color and the presence of blood albumin and casts.

MACE E. LICHTENFELD M.D.

D brunne H. Gunshot Fracture of Ulna and Radius
Fracture of Scapula and Humerus 94 5

The old classification of definite fracture types suggested by Birch has no significance when applied to modern war injuries. The modern shotgun

wound is a comminuted fracture by shell splinters of diverse shapes. It is without exception a injury of the most severe character with extensive wounding of the bone and soft parts. In the fractures of the extremities the local reaction plays a more important role than the character of the break. The gunshot injuries of bones close to the body and of the joints due to their more menacing character are all treated greater attention. Modern war injuries are most nearly paralleled by the open fractures of modern transportation accidents.

The first rule should be immobilization of the bone injury. Modern warfare has shown with particular clarity that this measure is of extraordinary importance for both shorter and longer transportation. Wound reduction can nearly always be undertaken first in the front line hospital. It is to be emphasized however that this first immobilization is not to be complicated with reposition of the fracture fragments, this being undertaken only after removal of the acute wound conditions. For example the mortality of gunshot fractures of the thigh during the World War after introduction of the extension splint of Thomas fell from 90 to 20 per cent. The plaster-of-Paris splint in its classical form is of great significance in modern transport from the front toward the rear. Fixation and extension are two entirely different concepts. Continuous extension is possible only when the pull and counter pull can be endured by the patient. Extension is done for reposition. However it cannot replace fixation. Fixation alone guarantees excellent conditions for healing. Modern extension treatment can be carried out only under stationary conditions. Extensions on splints have not stood the test for long and medium long stretches of transportation. The patient with a plaster splint endures a long journey incomparably better than one in an extension splint.

The author then discusses the different measures for good fixation. He recapitulates briefly the points which must be observed in the preparation of plaster dressing. Unpadded plaster splints should be applied only by those trained in this work. He draws attention particularly to the extension plaster dressing of Gocht. The healing of a gunshot wound depends first on the character and grade of the defect, second on the size and localization of the osseous destruction and third upon secondary factors such as the general condition, collateral injuries, nerves and vessels.

The author discusses the bases whereby an infection and pseudarthrosis may arise. He recommends that in the treatment of the wound not all bone splinters be heedlessly removed and that all fragments which have any adherence to the surrounding soft parts also be left to the periosteum be left in the wound. Animal experimentation has convinced the author that bone defect up to 8 mm in breadth will heal with osseous union but those of 10 or more millimeters will not heal. In the latter cases the bone defect is established as a bridge like callus with the

biochemical changes result from pro-
 deficiency which is in some way de-
 restoration of circulation through
 issue. Another theory is that the
 ed in traumatic edema may develop

shock, not necessarily associated with
 or even with any injury presents a slow
 systolic blood pressure, and must be
 d from severe secondary shock. This
 recedes with rest alone. It is possible,
 at it may persist until secondary shock
 and confuses the picture.

patients should be treated in a special
 ward. General measures such as relief
 arrest of hemorrhage, warmth, raising the
 the bed, and the administration of fluid are
 own. The author also emphasizes the follow-

its
 arly and adequate transfusion. Blood, plasma,
 m should be given until the blood pressure is
 , and if the blood pressure falls again further
 usions must be given.

Administration of oxygen

Limitation of transudation by bandaging and
 tion of crushed limbs

Proper local treatment of injuries

SAMUEL H. KLEIN, M.D.

Linde, S. Postoperative Thrombo-Embolism, Fre-
 quency, Time of Occurrence, and Duration of
 the Course of the Disorder. A Statistical In-
 vestigation (Postoperative Thrombose-Embolie-
 Komplikationen, Frequenz, Zeit des Auftretens und
 Dauer des Krankheitsverlaufes. Eine statistische
 Untersuchung). *Acta chirurg Scand*, 1941, 84, 310.

Linde states that the steady increase in the use of
 heparin as a preventive means against postoperative
 thrombosis has also forced other relevant questions
 into the foreground, i.e., the frequency of postopera-
 tive thrombosis and its effect on the mortality and
 on the duration of the patient's sojourn in the hos-
 pital after the operation. In an attempt to elucidate
 these problems statistically, he has used the material
 of the surgical sections of the Maria and Sab-
 batsberg Hospitals of Copenhagen for the years
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The total material amounted to 11,401 cases.
 Evidently, it was out of the question to go through
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 in the table is undoubtedly somewhat too low. On
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embolism, or 2.3 per cent, and this complication was
 the cause of death in 41 cases, or 11.3 per cent of the
 total fatal cases after operation. Forty-five cases of
 thrombo-embolism were found at necropsy in the
 4 additional cases, the complication was only an
 accessory finding.

In the estimation of the duration of the hospital
 stay of the patients, only true cases of thrombo-
 embolism and those in which it was the sole cause
 of the prolongation of the hospital stay were taken
 into consideration. About 13 per cent of the patients
 were younger than thirty years, while 87 per cent
 were older. The symptoms of the complication ap-
 peared in general about ten days after the opera-
 tion; the shortest time of appearance was two days.
 The duration of the hospital stay beyond the normal
 period varied for individual groups, but remained
 within rather narrow limits for most groups: for
 cholecystectomy thirty-nine days, for appendectomy
 forty days, for appendectomy with drainage forty-
 two days, for abdominal and similar operations forty-
 three days, and for varicose vein extirpation thirty-
 nine days. The average prolongation of the hospital
 stay beyond the normal period for the 259 mixed
 cases of thrombo-embolism was from thirty-seven
 to thirty-eight days.

RICHARD KEMEL, M.D.

Pettersson, G. Three Cases of Pulmonary Em-
 bolism on the Operating Table (Drei Fälle von
 Lungenembolie auf dem Operationstisch). *Acta
 chirurg Scand*, 1941, 84, 321.

In its various forms, embolism is a rightfully
 feared surgical complication, even though it occurs
 rarely. Surgery in itself may reveal the direct cause
 of embolism, as for instance in the majority of cases
 of air embolism. Cases in which foreign bodies such
 as bismuth salve and oil are introduced into fistu-
 lous tracts or canals for therapeutic or diagnostic
 purposes and thence reach the blood vessels may
 also be included in this category. Even autogenous
 material may produce emboli during an operation,
 for instance, fat emboli during orthopedic operations.
 Tissue and tumor emboli are also imaginable. Pul-
 monary emboli may be produced by the separation
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 tion of 3 such cases leads the author to believe that
 this surgical complication has not received sufficient
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In the author's first case a woman with a large
 intraligamentous myoma came to operation after
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 nal uterine amputation was done and during the
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 suddenly stopped breathing and became pulseless.
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 thrombus of the same color as the embolus in the
 left iliac vein.

In the second case a woman with acute hemorrhage
 in a hypernephroma suffered thrombosis one week
 after an exploratory laparotomy. Four weeks later
 after she had been up for four days, the second
 operation was done. During the nephrectomy a pul-

guaranteed. This cannot be attained by packing but only by adequate drainage. The dressing should be absorbent. A dry dressing is preferable to one that contains an ointment or greasy substance. Dressings with Dakin's solution or Rivanol solution have sometimes proved satisfactory. The changing of bandages is painful and for this reason should be done under even anesthesia. Not infrequently additional later incisions and opening of new pockets may be necessary.

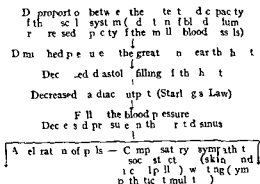
When the patient's life is endangered and the progression of infection can no longer be controlled by incisions, preservation of the extremity should be forsaken. The best type of amputation incision is a simple circular section or amputation. However it is of utmost importance to leave the wound open. Any suture is strictly forbidden. Any artificial formation of flaps is a mistake. The end result of the stump is not a problem of the field hospital. Excessive retraction of the soft parts can be counteracted by mastizol traction dressing.

The author has not used gas gangrene serum either prophylactically or therapeutically. He has utilized multiple blood transfusions instead. In virulent cases these transfusions have been of no value and in other favorable cases he has not been convinced of an immediate influence of the blood transfusions upon healing. He has been convinced repeatedly that the important factor in treatment is to rely upon timely diagnosis of the infection and surgical care. (ZILLMER) EDWARD W. GIBBS, M.D.

OPERATIVE SURGERY AND TECHNIQUE POSTOPERATIVE TREATMENT

McMichael, J. Circulatory Collaps and Wound Shock. *Id.* 24 *Id.* 104 48 16

The author summarizes the physiological mechanisms of shock in the following outline:



Recent attacks in England have broadened clinical experience in shock. The author describes the types of cases to illustrate the major problems: (1) shock due to loss of plasma constituents, (2) shock due to hemorrhage, and (3) shock due to hemorrhage combined with plasma loss.

Trauma leads to blood loss and plasma transudation in the injured area. As a result of the lowering of plasma and blood volume, a severe depression of cardiac output occurs which results in oxygen deprivation. Oxygen deprivation leads to a further increase in capillary permeability. This makes treatment difficult as plasma is not retained. In favorable cases, however, the deleterious effect on capillary permeability is reversed if a good state of circulation can be maintained. Early treatment and assiduous and continuous attention are necessary in the management of shock to secure this end. If the serum is transfused, not retained as will be shown by rising hemoglobin and falling blood pressure figures, further transfusion must be given.

Determinations of the pulse rate are important in evaluating the degree of deterioration in cases of circulatory collapse, and in a general way this also holds in shock. A rising pulse rate corresponds to the fall in blood pressure and blood volume. However, racing pulse rates are seldom encountered even in severe shock. Pulses from 100 to 120 are common but more rapid pulses are rare. Slow pulses, however, are encountered and the evidence does not exclude shock. Furthermore, the pulse may not fall much with the restoration of blood pressure in treatment. It often continues to be rapid for a day or two after the blood pressure has been restored to a satisfactory level.

The biochemical changes in shock include the following:

1. An increased permeability of capillaries may be indicated by a rise in plasma protein and alkaline albumin from the blood.

2. Rising blood urea is common to a number of conditions of cardiovascular collapse, hematemesis, diabetic coma, and the cases of Addison's disease. High values are also encountered in shock but not so high as those in hematemesis.

3. Rising serum potassium and falling sodium and chloride are important factors. These changes only appear after the blood pressure has been at a low level for a long time. In many instances they are late moribund changes. The distribution of inorganic ions is normally sodium and chloride extracellularly and potassium and phosphate intracellularly. A diathesis approaches it would appear that the important differential cell membrane permeability is lost with a resulting rise in the serum potassium and fall in sodium. Suprarenal cortical hormone and so-called chloride injections have been recommended for the treatment of this change but so far with not much success. The essence of our therapeutic should be to prevent these changes by the early treatment of shock.

A clinical picture of toxemia similar to that seen following severe burns has been noted following prolonged crushing injuries. The course is characterized by concentration on vomiting, alternating drowsy, delirium and mental clarity, progressive rise of the blood urea and fall of plasma chloride. Serum potassium is high from an early stage. It is

SURGICAL TECHNIQUE

suggested that biochemical changes result from profound renal insufficiency which is in some way dependent on the restoration of circulation through dead muscle tissue. Another theory is that the transuded fluid in traumatic edema may develop lethal properties.

Primary shock, not necessarily associated with severe injury or even with any injury present a slow pulse and low systolic blood pressure and must be differentiated from severe secondary shock. This stage usually recedes with rest alone. It is possible, however, that it may persist until a secondary shock develops and confuses the picture.

Shocked patients should be treated in a special resuscitation ward. General measures such as relief of pain, arrest of hemorrhage, warmth, using the foot of the bed, and the administration of fluid are well known. The author also emphasizes the following points:

1. Early and adequate transfusion of blood plasma or serum should be given *as soon as the blood pressure is normal* and if the blood pressure falls, give further transfusions must be given.
2. Administration of oxygen.
3. Elevation of crushed limbs.
4. Proper local treatment of injuries.

SPENCER H. KIRBY, M.D.

Linde S. Postoperative Thrombo-Embolism: Frequency, Time of Occurrence, and Duration of the Course of the Disorder. A Statistical Investigation. (Postoperative Thrombo-Embolie: Komplikationen: Frequenz - Zeit der Ausbreitung und Dauer des Krankheitsverlaufes. Eine statistische Untersuchung.) *Acta Chirurgica Scandinavica* 1934, 104, 310.

Linde states that the steady increase in the use of heparin as a preventive means against postoperative thrombosis has also forced other relevant questions into the foreground, i.e., the frequency of postoperative thrombosis and its effect on the mortality and on the duration of the patient's sojourn in the hospital after the operation. In an attempt to elucidate these problems statistically, he has used the material of the surgical sections of the Maria and Sæbø Hospital, Copenhagen for the years from 1934 to 1939, inclusive.

The total material amounted to 11,101 cases. Evidently it was out of the question to go through each individual history, and therefore the number of thromboembolic cases was taken from the diagnoses given, but subsequent review of the cases with normal course showed that in a number of patients with thromboembolism the diagnosis had not been given for some reason or another. Consequently, in certain large groups like those of cholecystectomy, appendectomy, and radical intervention for inguinal hernia, hydrocele, and varicocele, the frequency of the thromboembolic complication given in the table is undoubtedly somewhat too low. On the other hand, the mortality figures correspond to the actual facts. There were 259 cases of thrombo-

embolism, or 2.3 per cent, and this complication was the cause of death in 11 cases or 11.3 per cent of the total fatal cases after operation. Forty-five cases of thromboembolism were found at necropsy; in the 11 additional cases, the complication was only an accessory finding.

In the estimation of the duration of the hospital stay of the patients, only true cases of thromboembolism and those in which it was the sole cause of the prolongation of the hospital stay were taken into consideration. About 15 per cent of the patients were younger than thirty years, while 85 per cent were older. The symptoms of the complication appeared in general about ten days after the operation, the shortest time of appearance was two days. The duration of the hospital stay beyond the normal period varied for individual groups, but remained within rather narrow limits for most groups: for cholecystectomy thirty-nine days, for appendectomy forty days, for abdominal and minor operations thirty-two days, and for varicose vein operation thirty-three days. The average prolongation of the hospital stay beyond the normal period for the 259 mixed cases of thromboembolism is from thirty-seven to thirty-eight days.

RICHARD KIRBY, M.D.

Pettersson, G. Three Cases of Pulmonary Embolism on the Operating Table. (Drei Fälle von Lungenembolie auf dem Operationstisch.) *Acta Chirurgica Scandinavica* 1931, 84, 321.

In its various forms, embolism is a rightfully feared surgical complication, even though it occurs rarely. Surgery in itself may reveal the direct cause of embolism, as for instance in the majority of cases of air embolism. Cases in which foreign bodies such as bismuth salve and oil are introduced into fistulous tracts or canals for therapeutic or diagnostic purposes and thence reach the blood vessels may also be included in this category. Even autogenous material may produce emboli during an operation, for instance fat emboli during orthopedic operations. For instance, fat emboli are also imaginable. Pulmonary emboli may be produced by the separation of a thrombus during an operation. The observation of 3 such cases leads the author to believe that this surgical complication has not received sufficient attention.

In the author's first case a woman with a large intraligamentous myoma came to operation after three days of subfebrile temperature. A supravaginal uterine amputation was done and during the pentonization of the operative cavity the patient suddenly stopped breathing and became pulseless. Autopsy revealed pulmonary embolism and a fresh thrombus of the same color as the embolus in the left iliac vein.

In the second case a woman with acute hemorrhage in a hypernephroma suffered thrombosis one week after an exploratory laparotomy. Four weeks later, after she had been up for four days, the second operation was done. During the nephrectomy a pul-

monary embolism occurred and the patient died on the table. The autopsy revealed emboli in the pulmonary artery and pulmonary metastases as well as thrombi in the left saphenous vein and the right iliohypogastric vein.

In the third case a woman with a large intrathoracic struma showed symptoms of compression. She was in bed for eleven days before the operation with a subfebrile temperature and a pulse falling from 85 to 75. During the operation under local anesthesia the patient lost consciousness during the separation of the struma. respiration ceased and the pulse weakened. Artificial respiration brought about some improvement and the operation was completed. Signs of bronchopneumonia developed and death occurred on the fourth day. Autopsy revealed pulmonary infarcts of about four days duration.

All of these 3 patients had large tumors situated in the immediate vicinity of large venous stems in which the impairment of the circulation is a strong factor favoring thrombosis. In the second and third cases the thrombosis did not develop immediately toward the periphery of the blood current. The explanation for the occurrence of the embolism just at the time of the operation may lie in the fact that in 2 cases the emboli appeared during the blunt separation of the tumor. In Case 1 the direct traumatization of a thrombosed vein may have been the exciting cause, but in Cases 2 and 3 the tugging and dragging on the tumor may have produced a suction and pressure in the adjacent vessels which resulted in mobilization of the distant thrombus. Comparison of the author's cases with those of the literature points to the suggestion that pulmonary emboli appearing during the operation occur in 1) operative groups of cases (1) in extirpation of large tumors situated in the body cavities near large venous stems and (2) in amputations of the thigh because of septicallly infected severe injuries of the lower extremity. They may occur also in other groups of cases but in the two groups mentioned they should be thought of particularly.

All of the author's cases showed a pre-operatively increased temperature which was not attributed to the thrombosis in Cases 1 and 3, but in Case 2 the temperature was a manifest thrombosis of the left femoral vein four weeks before the last operation. The pulmonary embolism in such a case was determined only at the autopsy of Case 1 the diagnosis of embolism was considered possible at operation but not probable as the patient felt perfectly well. In Case 2 the diagnosis of embolism was made immediately after the operation because of the preceding thrombosis and its sudden onset during a quiet anesthesia. In Case 3 the embolism was suspected because of the site of the operative area but typical symptoms of pulmonary embolism were not observed and in the further course the diagnosis of pulmonary infarct was not made. The symptomatic picture of pulmonary embolism in a comatose patient differs from the usual picture only insofar as there are no subjective symptoms. In Case 3 and 1 with obstructing emboli

the picture was characterized by the sudden onset of the cessation of respiration and the pulse. In Case 3 (under local anesthesia) in which the site of operation was in the anterior mediastinum the pulmonary embolus was not obstructing the trachea and the rest of the patient may explain why the embolus was first observed when the respiration ceased and the pulse became poor. The author believes that a non-obstructing pulmonary embolus gives very insignificant or absolutely no symptoms in a narcotized patient. Case 3 also shows that the diagnosis of pulmonary infarct after an operative embolus may be easily overlooked and the author suggests that among the postoperative pulmonary complications appearing one or two days after operation a pulmonary infarct due to small non-obstructing pulmonary emboli which have appeared in an anesthetized patient during the operation may occasionally be missed.

The diagnosis of pulmonary embolism during the operation offers great differential diagnostic difficulties as the emboli occur usually in anesthetized patients. General anesthesia may be complicated permanently or transiently by cessation of the respiration and pulse weakness. This observation was made very often during the chloroform era but less often after the transition to the use of ether and nitrous-oxide anesthesia. In the latter it has been shown experimentally that in certain cases there is a hyperventilation of the carotid sinus so that pressure on the same may produce cessation of respiration and transient circulatory disturbance. This finding has led to the conclusion that in man it may lead to death. In these cases the pressure could be produced by the hands of the anesthetist who draws the jaw of the sleeping patient forward. To a certain extent the same may be said of the injection anesthetics. In spinal anesthesia severe shocklike intervals occur occasionally often in the first twenty minutes and usually before the operation has begun. The absence of local thoracic symptoms excludes mistaking such an occurrence for a pulmonary embolus. It should be remembered that the pulmonary embolus in the cases described heretofore always appears suddenly and unexpectedly during a quiet anesthesia. It should also be remembered that deaths from anesthesia are due to an overdose. The diagnosis of death from anesthesia must never be made without a previous autopsy with special attention to the possibility that an embolus may be the cause of death.

In differentiating between death from thrombosis and death from air embolism occurring during an operation there is less difficulty. The picture of venous air embolism differs with the onset of the venous air embolism there is heard in the majority of cases a flapping or churning sound followed immediately by a rippling or gurgling sound over the heart. Dyspnea unconsciousness and deep cyanosis are marked pallor occurs. The pupils dilate the reflexes disappear and the pulse rapidly becomes weaker. If death occurs only after one or two hours

a transient improvement of the cardiac activity and respiration may take place. The arterial air embolism occurs only in interventions on the thorax or lungs. The symptomatic picture is controlled by symptoms of the central nervous system: clonic and tonic cramps, convulsions, pareses and plegias, visual disturbances, and disturbances of the cardiac activity and respiration. A localized marmorization of the skin, air vesicles in the arteries of the eye ground or sector-like anemia of the tongue confirm the diagnosis.

Fat embolisms are rare as a complication in bloody operations and have been seen almost solely in operations on the skeleton. The symptoms appear only from a few hours to one-half day after the operation. Dyspnea, cyanosis, a rising pulse frequency, a diminishing blood pressure, a rising body temperature, and unconsciousness complete the picture of a fatal fat embolism.

Tumor embolisms can occur only in operations for hypernephroma. Aside from the structure of the embolus, there are no basic differences from a thrombo-embolism of the same size.

The most important treatment in these cases is prophylactic. If possible the patient should be up and around daily up to the day of operation. If rest in bed is necessary for any reason, pre-operative heparin therapy should be instituted. The possible presence of a thrombosis should be carefully investigated before the operation; the examination should include the local findings, the temperature and pulse curve (climbing pulse), the blood sedimentation rapidly, the skin temperature, and venography. If thrombosis is present, two procedures are available; the choice depends upon the gravity of the indications for the operative treatment of the basic condition. One can wait until the thrombus has had time to organize or remove the thrombus surgically. In the first instance one must wait several months, as Case 2 showed that one month was too short an interval. In order to proceed surgically the thrombus must lie in the saphenous, femoral, or iliac vein. Kulenkampff has divided the saphenous vein and has extracted the thrombus in the femoral and iliac veins from there. Freund has opened the femoral vein and removed the thrombus; in 2 cases he also ligated the femoral vein. Laeven exposed the femoral, the external iliac, and the common iliac veins temporarily clamped the common iliac vein and withdrew the thrombus through an incision in the femoral vein. Kulenkampff considers the clamping of the common iliac vein as superfluous, as the positive venous pressure prevents embolism.

In septic thrombophlebitis an extensive operation, such as amputation, may have to be preceded by ligation of the veins as centrally as possible beyond the thrombus. If the diagnosis of septic thrombophlebitis is uncertain, the risk of an exploratory incision over the femoral vein may be taken to determine whether a thrombus exists or not.

If a pulmonary embolism has already occurred on the operating table, the usual injection therapy and

artificial respiration are indicated. Only after these measures fail, is the Trendelenburg operation indicated.

LOUIS NEUWELT, M.D.

Robb-Smith, A. H. T. Pulmonary Fat Embolism, Pathology, Pathogenesis, Therapeutics, Clinical Material, Case Histories. *Lancet*, 1941, 240: 135.

Pulmonary fat embolism is regarded as an uncommon complication of a fracture of a long bone. A study of a series of deaths following accidents reveals that it is an almost constant finding, and in many cases is probably a major factor in the fatal outcome. In severe injuries the importance of the various factors—shock, blood loss, visceral contusion, and displacement—is difficult to assess. The frequency of fat embolism as a morbid anatomical finding suggests that it is one of these factors, and should encourage its clinical recognition and treatment. Conditions which may induce fat embolism range from a severe shaking without bony injuries to multiple and compound fractures; it is also to be found after severe burns and in certain cases of poisoning particularly with alkalies and, rarely, after manipulative operations and the therapeutic injection of oils.

The symptoms of pulmonary fat embolism arising from injuries come on after a symptom-free interval varying from a few hours to several days. The patient becomes dyspneic, pale, cyanosed, and restless, and, with little coughing, brings up frothy sputum which may be blood-stained. Fat emboli in the systemic circulation may produce purpura, or cerebral symptoms such as stupor, fits, or palsies. The blood pressure does not fall. The clinical picture may be mistaken for surgical shock or internal hemorrhage, the cerebral symptoms may simulate cerebral contusion, and the purpura may be confused with the purpura of septicemia. The diagnosis should be considered in all cases of injury developing pulmonary or cerebral symptoms. A characteristic feature is the "symptom-free interval"—a period varying from a few hours to two days, during which the patient's condition apart from the injury is comparatively good. Symptoms developing after five days are unlikely to be due to fat embolism. Examination of the unfixed fresh sputum, stained by adding a few drops of an alcohol-acetone solution of Sudan III, shows free fat droplets present in addition to fat-containing alveolar phagocytes. Lipuria, when present, is not usually found until a week after the accident. The presence of fat globules in the retinal vessels in severe cases of fat embolism has been noted in rare instances.

The post-mortem diagnosis of pulmonary fat embolism is most readily confirmed by the examination of a fresh preparation. Snippets of lung placed on a slide and covered with a few drops of 2 per cent potassium hydroxide show the fat lying in the alveolar capillaries as cylinders, or in a racemose formation. The fat emboli are refractile and show a narrow dark edge, whereas air bubbles are found to be more highly refractile and have a broad dark rim. In patients dying in the late pneumonic stage very

little fat may be found in the capillaries but much may be found in the alveoli and it may then be difficult to distinguish this appearance from that found in inhalation pneumonia though in the latter condition fat is never found within the capillaries. The examination of fixed tissue shows capillary congestion with intra-alveolar hemorrhages and edema alternating with zones of emphysema. In paraffin sections the breaks in continuity of the column of erythrocytes in vessels may be noted but frozen sections stained for fat reveal the branching emboli of fat and in the later stages fat both free and in alveolar phagocytes in the alveolar lumina. In a number of patients who died shortly after a severe injury the lungs showed no gross changes yet microscopic examination revealed massive fat emboli. It is probable that in these cases the circulation ceased before the tissue changes induced by the emboli developed. In a patient who died suddenly large masses of fat were lodged in the pulmonary artery in a singular manner in a thrombus lodged from a vein. It appears that the fat is entirely derived from released tissue fat entering the circulation from the traumatized area although as a result of the trauma there may be a change in the physicochemical state of the normal blood fats with a loss of emulsification. It is conceivable too that traumatized tissue may release a lipoproteinase which splits the lipoprotein complexes of the blood. It is not known for certain whether death in fat embolism is caused by a general anoxemia because of the interference with respiratory function local anoxemia of a vital center due to a fat embolus cardiac failure due to physical pulmonary obstruction or a neurocardiac mechanism. Flaccidation of this problem is essential if rational therapeutic measures are to be adopted.

In the prevention of fat embolism the most important measure is early immobilization of the injured region with a minimum of manipulation. Active treatment is directed toward the relief from anoxemia with oxygen administered either by mask or by tent. The value of atropine is doubtful and it is also questionable whether stimulants like camphor are of value. Morphine is too depressant but the barbiturates are the least harmful of the effluents. In the presence of shock fluid may be administered intravenously but with the onset of the symptoms of fat embolism intravenous fluid should be discontinued since right heart failure is frequent. The use of a large alkaline salt and ether to prevent the passage of fat through the lungs into the systemic circulation or to convert it into a harmless state has not been established. A single injection of 0.05 gm of 20 percent sodium desoxicol solution was given in one case. The patient's pulmonary condition improved rapidly but he developed cerebral fat embolism from which he died. The development of pneumonia requires its usual treatment.

The pulmonary symptoms which arise from exposure to the blast of a high explosive may be due to a combination of pulmonary concussion (a term preferable to blast injury or pulmonary contusion)

and fat embolism. Fat embolism should be specifically looked for in autopsies on a rapid casualty. If their frequency is confirmed the treatment of such cases may have to be revised.

Of 789 consecutive patients meeting with accidents 55 died of these 41 had gross pulmonary fat embolism and in 29 this condition was thought to have played a major part in causing death. Of the patients who died 12 had no bone injury but 6 of these appeared to have died from fat embolism including 1 air raid casualty.

MAURICE L. LICHTENSTEIN, M.D.

ANTISEPTIC SURGERY TREATMENT OF WOUNDS AND INFECTIONS

Crawford A. S. and Hoopes B. F. *The Surgical Aspects of Lightning Stroke*. Surgery 1941, 9, 80.

The authors quote the death statistics of the largest area of the United States showing that in the period between 1924 and 1933 there were 3,840 deaths due to lightning. The mountain and southern states had the highest death rates while the northeast and middle Atlantic states had the lowest.

Burns are the most common lesions due to lightning stroke and may be of any degree of severity. The burn may be of a bizarre pattern such as arborescent markings along narrow lines located on the surface of the body. Burns may be superficial or deep by metal objects in the clothing or pocket. Associated with the burns large lacerations may be caused by the explosive force of the lightning stroke. The most frequently reported signs of special sense that have been affected by lightning stroke are the ears and eyes. Cataracts have been noted with a severe degree of frequency. Lesions of the respiratory system following lightning stroke are often bizarre and varied ranging from muscular weakness to complete paralysis. Various types of pathological changes are observed in the nervous tissue and all degrees and types of nerve degeneration are described.

The authors found reports in the literature of skull fractures caused by lightning stroke and a direct in which a sequestrum was spontaneously extruded three months after the injury. They report a case of their own in which a patient was evidently struck by lightning while standing against the metal sink in her kitchen. She was admitted to the Henry Ford Hospital approximately one and a half hours after the accident. She was unconscious and could not be aroused. The systolic blood pressure was 110 mm. Hg. The patient was that of profound shock. Her chest was clear, the blood pressure was 120/80 mm. Hg, the respiratory rate 20 per minute. She had several metal hair curlers in her hair but there were no burns under these. The right ear was almost completely avulsed and the mastoid bone apparently broken open. The edges jagged and charred. Sanguineous material disported briskly from the canal of her right ear. There were burns of the chest all around of both wrists. The patient regained consciousness 12 hours after the accident. The area

were debrided and sutured, and the burns treated in the usual manner. Sulfanilamide was administered as a prophylactic measure against meningitis, which was expected and did occur. Rapid spinal drainage was carried on for six days, after which the patient apparently proceeded with a normal convalescence.

The authors state that this is the first reported case of recovery from a skull fracture with brain injury resulting from a lightning stroke. They believe that the prophylactic use of sulfanilamide prevented a septic meningitis.

WILLIAM C. BICK, M.D.

Marble, H. C. Purposeful Splinting Following Injuries to the Hand *J Am M Ass*, 1941, 116: 1373

Rest is the greatest therapeutic agent known in superficial abrasions, burns, and infections of the hand. Splinting in a neutral position, elevation, and rest in bed are essential in treating these injuries.

Fractures of the wrist and hand should be splinted as follows: Colles' fractures in flexion-pronation; carpal fractures with the wrist in extension; the metacarpal bones fixed in extension, and the fingers permitted to fall into the position of flexion; fractures of the metacarpal bones with all fingers in the extended position; phalangeal fractures in flexion, or they may be treated by means of traction and a banjo splint.

Splinting following the repair of tendons is extremely important. The splint should be applied so as to relieve all tension on the injured tendon. In the event of lacerations of the extensors, the wrist and metacarpophalangeal joints must be splinted in complete extension. In flexor-tendon injuries, splinting must be done with the wrist, fingers, and thumb in flexion.

In radial-nerve injuries, the wrist, metacarpophalangeal joints, and thumb must be splinted in full extension. If the ulnar nerve is injured, the thumb must be splinted close to the index finger (adductor relaxation), the metacarpophalangeal joints flexed at right angles (interossei and lumbrical relaxation), and the middle finger semiflexed. Injury to the median nerve requires that the opponens muscles be relaxed, i.e., the thumb brought into the palm of the hand so that it points to the ring finger, and the fingers held in extension.

Contractures following injuries can often be overcome by a slow, steady, slight pull with garter-elastic traction.

Various materials for splints are discussed. The advantages and disadvantages of wood, sheet aluminum, plaster of Paris, castex, and thermex are pointed out.

The author emphasizes the important fact that no form of physical therapy supplants active voluntary use of the hand in restoring function. Active motion is started early, often with the splint in place.

No harm results from this procedure and optimum end-results will be obtained.

LUTHER H. WOLFF, M.D.

Allen, H. S. The Treatment of Superficial Injuries and Burns of the Hand *J Am M Ass*, 1941, 116: 1370

Injuries to the skin and subcutaneous tissues of the hand are divided into two groups, i.e., those which are sharply lacerated, and those resulting from crushing or avulsion injury.

Open wounds should be converted into closed ones as early as possible. Wounds seen within six or eight hours from the time of injury may be safely converted into closed wounds except when they have been injudiciously tampered with, or when they have been received at the autopsy or operating table or from a mouth bite.

A simple sterile dressing, with light sustained pressure if bleeding is active, is the only emergency care a wound needs. A splint may be applied for transportation.

The care of the patient with a hand injury in the emergency operating room is described in detail.

Aseptic procedures are essential. The entire personnel should be properly masked, gowned, and gloved, as infection from droplet contamination frequently occurs. The area of skin surrounding the lesion is thoroughly shaved and cleaned with simple white soap, cotton pads, and copious amounts of water. After the preliminary cleansing the gloves, gloves, and solutions are changed and the wound itself is thoroughly but gently cleansed with soap and saline irrigations. A blood pressure cuff is then applied and inflated to 260 mm. of mercury. Gloves are again changed, and the wound is draped.

After anesthesia (general or local) has been obtained, the wound is carefully debrided, warm saline solution being used for mechanical cleansing. The diagnosis of the extent of the lesion is made and the structures involved are ascertained. Blood vessels are ligated and, with gentle handling of the tissues, the subcutaneous tissues are repaired with fine silk and the skin is closed with horsehair. A large soft pressure dressing is then applied, and the extremity splinted.

Crushing or avulsion injuries to the hand are more serious and may result in serious impairment of function.

General anesthesia is desirable for the repair of these wounds, since local anesthesia tends to further impair the circulation. The blood pressure cuff is usually not used. Debridement is extensive until normal bleeding or tissue of good color is found. If the skin cannot be closed without tension, an immediate graft of intermediate thickness is applied. At times pedicle or pocket flaps of the abdomen or thigh are useful in covering raw surfaces. A large firm dressing is applied after the closure to prevent secondary edema, venous stagnation and hematoma formation. The hand should be immobilized with splints. Crushing wounds which do not produce lacerations (such as wringer injuries) should have a large pressure dressing applied, and the extremity should be splinted to prevent progressive hematoma formation.

Burns of the hands are best regarded as large open surgical wounds. A sterile dressing only should be applied as an emergency measure. Later after general care of the patient the burn is thoroughly cleansed aseptically. The burned member is placed in warm circulating water. Blisters and loose tissue are cut away and the burned area is washed and flushed with sterile saline solution. The burn is then covered with petrolatum gauze and a large soft firm dressing is applied with the fingers separate and the hand splinted in the position of function. Dressings are left undisturbed for a period of fourteen days after which crusts and exudates are removed with moist saline or hypochlorite pressure dressings which are changed daily. As soon as the crusts separate and granulations appear healthy a skin graft is applied.

In all injuries of the hand rest of the part is insured by splinting and non interference with the dressing when there is no indication to interfere.

LEITCH H. WOLFE M.D.

Childress H. M. Subfascial Hematoma as a Complication of Crushing Injuries to the Foot J. B. & Co. 15 1941 23

Crushing injuries to the dorsum of the foot usually produce marked hemorrhage in the subfascial spaces regardless of whether fractures of the foot bones also occur. The resulting circulatory disturbance is prompt and may be sufficiently severe to produce permanent damage unless relieved immediately by multiple incisions through the fascia with evacuation of the hematoma. The cruciate and transverse ligaments may act as constricting bands in subfascial swelling and may have to be sectioned if the circulatory block is persistent. Delayed or inadequate treatment may result in severe cases in the so-called "congealed foot" or in actual necrosis of the toes or soft tissues of the dorsal forefoot with prolonged and permanent disability. CHESTER C. G. V. M.D.

Vener H. I. and Bower A. G. Clinical Tetanus Treatment in 100 Consecutive Cases with a Net Mortality Rate of 19 Per Cent. J. Am. Med. Ass. 1941 26 67

By treating 100 consecutive patients with tetanus in an antinatal manner the authors were able to reduce the gross mortality rate prevalent in past years by 27.5 per cent. If the patient died during the first twenty-four hours of hospitalization it excluded the series presents a net mortality rate of 19.3 per cent among 88 patients. No material alteration in the mortality rate was obtained among the 5 females; the rate remaining approximately 50 per cent in contrast to 13 per cent among the 75 males. The best results were obtained among children between the ages of ten and fourteen years but the general mortality rate of 50 per cent was not materially affected in patients under the age of four years or over the age of forty.

A patient with an incubation period of six days or longer under the described method of management

has a 75 to 80 per cent chance of recovery in contrast to the 50 per cent chance of the patients having a shorter incubation period.

Active therapy consists of (1) preliminary procedures (2) sedation of adequate nature (3) local treatment of the wound (4) antitoxin therapy (a) locally 20,000 units (b) intramuscularly 60,000 unit (c) internally 1,000 unit (d) intravenously 40,000 units in physiological solution of sodium chloride the dose is repeated in three hours with 20,000 unit if no reaction has ensued and (e) the intramuscular injection of 40,000 units proximal to the previous site of injection to make a total dose of 100,000 units given within a period of from thirty to thirty-six hours after hospitalization and (5) methenamine (15 gr.) given intravenously two hours after the first intravenous dose of 40,000 units of serum and from ten to twelve hours after each of the large intramuscular doses of antitoxin.

Serum sickness developed in approximately 30 per cent of the patients. Within the past year however new serums have produced relatively little serum reaction or sickness. Serum reaction occurs frequently if the antitoxin is kept at room temperature for twenty-four hours prior to its use and warmed in a lukewarm water bath for from twenty to thirty minutes immediately before use. The ordinary prophylactic dose of 1,500 units of antitoxin is given subcutaneously at four or five days interval for 4 doses to keep the patient desensitized. If the possibility of future orthopedic or other surgical measures exists the desensitizing doses are continued for a period of two weeks after the surgical intervention. If this precaution is not observed relapses occur.

Next to antitoxin therapy practical bedside management of the disease and its more common complications under proper medical and nursing direction is most important and preferably nurse-skilled in the care of patient with tetanus should be employed.

CHARLES B. GON M.D.

Lucell I. I. F. and Gildersleepe E. N. Anthrax J. Am. Med. Ass. 1941 6 505

The fatality rate for anthrax is still high being more than 100 per cent for the five years between 1934 and 1938 however it is 6 per cent less than the preceding five year period because of the early diagnosis and the better treatment given patients. The ideal treatment for anthrax is one which (1) does not harm the patient (2) produces the least mortality rate (3) reduces the period of disability (4) the fatality rate and (5) is easily given. Successful treatment depends upon (1) early diagnosis (2) antitoxin therapy (3) serum penicillin and (4) sulfanilamide. A few patients have been treated with the latter but in sufficient numbers to allow adequate appraisal.

Forty-eight patients with anthrax were treated as follows: (a) with serum (b) with neocapsulamine (c) 5 with serum and neocapsulamine

(d) 3 with sulfanilamide, and (e) 1 with sulfanilamide, serum, and nearsphenamine

Nearsphenamine gave the best results in selected cases. However, if the patient is afflicted with the internal type of anthrax, if the blood stream has been invaded, or if the lesion is on the face or neck, serum is the agent of choice. Serum should be given if there is doubt as to the type of treatment desired.

The dictum "hands off the lesion" should be adhered to strictly. SAMUEL KAHN, M.D.

Koenig, E. Subcutaneous Phlegmon Due to Diphtheria Bacilli. *Chirurg*, 1940, 12: 581.

Diphtheria of the skin in abscesses and in wounds became known through the epidemics which occurred in various cities following the last war. Guenther and Ehrhardt described a subcutaneous phlegmon in 1907, stating it was clinically characterized by a bluish-red discoloration of the skin, that it showed rapid extension, and was accompanied by high temperatures and the separation of the subcutis from the underlying fascia. The picture was always severe. Koenig presents a single clinical story which differs.

A nurse, while assisting at a tracheotomy in a child with diphtheria, was injured by the point of the scalpel through the rubber glove. The wound was at first ignored. Twenty hours later a dry wound about 2 to 3 mm. long was observed on the dorsum of the left hand. The borders were sharp and showed a dry swelling. There was no reddening. Moist dressings were applied and the hand was splinted. On the second day there was a marked increase in swelling associated with severe pain, and the borders of the wound were slightly reddened. A few drops of pus were removed from the wound. The temperature was 38.3° C. The wound was opened widely. There was a very narrow zone of frank infection from which pus exuded, otherwise only a light yellow or light brown edema. Still the swelling involved the entire dorsum of the hand, the extensor surface of the forearm, and a hand's breadth above the elbow. Multiple incisions were made over the involved hand and arm, and edema only was found, but no pus.

Cultures showed generous growths of diphtheria bacilli. A rapid regression of the edema followed. All of the wounds remained dry for one week. Diphtheritic membranes did not develop at any time. At the beginning of the second week, there was considerable drainage of pus and a small amount of pink granulation tissue. The primary point of infection produced considerable pus. Its surrounding area was bluish-red in color and somewhat infiltrated. On the sixteenth day there appeared near the primary injury, an area of necrosis about 1½ by 2 cm. in diameter and likewise a similar area of necrosis appeared on the extensor surface of the middle finger. Healing was slow under Peru balsam and was complete after two months. Ten thousand units of antitoxin had no influence. The function of the middle finger was not significantly disturbed.

This case was unusual in that the course was quite benign, the temperature rose only once to 38.3° C.

otherwise, not over 37.7°. There was an absence of membrane formation and a minimum amount of ulceration. Druegg has already shown with animal experiments that membrane formation and ulceration seldom occur. Accordingly, the membrane formation is not necessary as a criterion of the specific activity of the diphtheria bacillus. That there was a minimum tendency toward ulceration was already known (FRANZ) RUDOLPH W. RAWSON, M.D.

Domagk, G., and Hegler, C. Chemotherapy of Bacterial Infections (Chemotherapie bakterieller Infektionen). Leipzig: S. Hirzel, 1940.

This little book opens the first of a series of "Beitraegen zur Arzneitherapie." It treats of the sulfonamides and their derivatives predominantly. Following a very worthwhile review of the development of the chemotherapy of bacterial infections, the experimental foundations which were obtained heretofore in the infections with streptococci, staphylococci, gonococci, and pneumococci, as well as with anaerobes, are discussed, as well as the starting point for the clinical testing of the sulfonamides. The previously acquired clinical experiences, with the complete inclusion of the domestic and foreign literature, are then discussed.

The authors admit that a final decision on many aspects of the subject is not possible at the present time. However, from the existing surprising results in erysipelas, pneumonia, meningitis, and gonorrhea, they believe we must conclude that we are on the right track chemotherapeutically. Whoever wishes to work further on this subject along experimental or clinical lines will find this little book of advantage. (H. FUCHS) LOUIS NEUWELT, M.D.

Mazzeo, M. On the Anti-Bacterial Effect of the Sulfamide Preparations (Sull'azione antimicrobica dei preparati sulfamidici). *Rassegna interna di clinica e terap.*, 1941, 22: 39.

The treatment of streptococcal infections with a colored preparation containing the sulfamide-group sulfamidocroisidine (prontosil) was introduced in 1932. Since that time other similar preparations were tested, especially a series of non-colored substances, which were supposed to be less toxic (paraminophenyl sulfamide or white streptosil).

After a survey of the results obtained with such drugs by other authors in various infectious diseases, Mazzeo mentions the complications which may arise after such treatment: fever, emaciation, photuria, nitrogen crises, affections of the skin, digestive and nervous disturbances, and changes in the blood. Fortunately, statistics have proved that only 1 such result was observed in 100,000 cases treated with the substances in question. Most of the complications, moreover, can be prevented by careful management of the dosage, by regulation of the stools, and by avoidance of the simultaneous administration of other strong drugs. A few patients, however, are hypersensitive even to small doses of sulfamides, perhaps on account of a hereditary disposition. They

are in danger of a lethal agranulocytosis. Therefore the blood must be examined frequently and certain precautions must be taken.

The author is mainly interested in answering the question: In what particular way do the sulfamides achieve their curative success? Theoretically it is possible that they immediately weaken the bacteria or strengthen the defensive forces of the infected body by stimulating phagocytosis or by increasing the bactericidal forces of the serum. Mazzeo experimented with rabbits by injecting products of the sulfamide group (pontosil, derganil, pyridine derganil and pyridene) into the peritoneum.

In the first series of experiments uninfected animals were treated with sulfamides and the blood was tested four hours later. The number of leucocytes was increased after equal doses of derganil or derganil pyridine and after smaller doses of pyridene. The polynuclears were always increased, the lymphocytes were always decreased and the mononuclears were increased after the administration of derganil and pyridine derganil. The hemoglobin did not undergo any noteworthy changes.

The second series concerned the phagocytic power of the leucocytes. The blood of rabbits treated with sulfamide was centrifuged, the leucocyte could then be separated. Equal volumes (0.5 cc) of leucocytes of a suspension containing staphylococci and of physiological solution were mixed *in vitro* at 37°C. A microscopic preparation made after due time showed no increase of the phagocytic power of the leucocytes unless 0.5 cc of sulfamide was added to the mixture itself.

In the third series the author tested the bactericidal power of the whole blood. After the administration of sulfamide the bactericidal power proved to be remarkably increased against the staphylococcus but not against the typhoid bacillus.

Determination of the chemotherapeutic property of the sulfamides was the object of the fourth series of experiments. Rabbits which generally died after the injection of 50,000 staphylococci per kgm. of weight were inoculated with 100,000. To some of them sulfamide was administered simultaneously; the others were treated forty hours later. Most of the animals of the first group but none of the second group survived.

The author summarizes his results as follows:

The products of the sulfamide group produce a marked leucocytosis; they stimulate phagocytosis, increase the antistaphylococcal action of the blood and are when injected early highly effective from a chemotherapeutic point of view.

N. D. Cassu O.

Hurteau E. F. The Intracranial Use of Sulphonamides. Experimental Study of the Histology and Rate of Absorption. *Can. J. Med. Sci.* 1944, 44, 35.

At a time when sulfonamides have been advocated for use in contaminated wounds, this article is of interest to neurologists particularly specially

those who are dealing with wounds of the brain. A study was undertaken to find out what effect on the normal brain these sulfonamides had when placed in contact with it. The first question to decide was whether these substances destroy brain tissue and the second question whether the lowered excitability of drug of this group results in encapsulation and indefinite persistence of the drug. Further attempts were made to answer the question as to whether the use of the drug would increase the incidence of post-traumatic epilepsy.

Twenty-five cats were operated upon to ascertain the answer to the questions. A cortical area of from 0.5 to 1 cm. in diameter and of a depth to include part of the white matter and yet not enter the ventricles was made on symmetrical sides of the head. In one series the drug was inserted and the other wound was left as a control. An attempt was made to be sure that the sides were identical. An average of 100 mgm. of the drug was inserted and the dura was then closed tightly. The substances were left in from a period of four days to sixty or seventy-eight days and carefully toxicological studies were made at the end of that time. Extensive tables are given with the results indicated on them.

At first the drug caused a focal meningeal leucocytic response. Grossly it could be seen in the tissue as long as twenty days. There was no positive evidence of destruction of nervous tissue or fibrillar reaction in the method used in this study. There was no evidence deduced to show that these drugs increased the extent of scarring in the halving brain. Sulfapyridine was the slowest to be absorbed but could not be detected after thirty-four days. Sulfathiazole could not be detected after seventeen days and sulfanilamide could not be detected after eleven days.

On the basis of these experiments it would appear possible to use from 5 to 10 gm. of the powdered form in the human brain. This study shows that there are no contraindications to the use of these sulfonamides in the manner indicated for septic wounds of the human brain.

ADRIEN VERB LUGHEN M.D.

Reed G. B. and Orr J. H. Chemotherapy in Experimental Gas Gangrene. Distribution of Drugs from Infected Wound. *Lancet* 1944, 376.

Guinea pigs were given experimental gas gangrene by incising the muscles of the thigh and implanting the reinoculated mixed sterile soil and cultures of the organism to be tested. The wounds were then closed tightly with catgut. The soil contained calcium salts which are necessary for the germination of tetanus spores in tissues. This method was thought to most closely simulate naturally developing gangrene in man.

The furmox frequently encountered species of clostridia were used experimentally, namely, *Clostridium Type A septicum sordellii* and novy (*oedematum*). The minimal lethal doses of each culture was found

and the average survival times were determined by extensive controls

Groups of animals infected with clostridia (single species infection as well as multiple species infection) were treated with sulfanilamide, sulfapyridine, sulfamethylthiazole, and sulfathiazole. The drugs were administered locally, by mouth alone, and locally and by mouth in combination. (Promin was also used in a small group of animals but was found to be entirely ineffective.)

It was found in this series of experiments that all of the sulfonamides used were effective in a large percentage of cases in preventing a fatal infection.

The local use of the drugs proved much more effective than the oral use. Sulfathiazole proved to be the most efficient drug in all species of infection, in fact, it was the only drug that materially influenced clostridium novyi infections. Sulfamethylthiazole was the next most effective drug, while sulfapyridine was superior to the least effective drug sulfanilamide.

Sulfanilamide resulted in the saving of 25 per cent of the infected animals when administered orally, and 55 per cent were saved when the drug was introduced locally into the wound. The combined local and oral treatment produced a longer survival period, but the number of eventual fatalities was larger than when the drug was used locally alone. In contrast, 87 per cent of the infected animals treated with sulfathiazole recovered when this drug was introduced into the wound. These data show the superiority of sulfathiazole over sulfanilamide, the difference being partly due to the efficiency of sulfathiazole in clostridium novyi infections.

Groups of animals were infected and the sulfonamide introduced into the wounds one, two, three, four, or six hours after the infecting agent had been given. In these groups it was evident that sulfathiazole gave excellent protection up to three or four hours while sulfanilamide was comparatively ineffective at the end of one hour. The other two drugs gave intermediate protection. After six hours no drugs were of any value locally except in clostridium novyi infections, in which sulfathiazole gave as good results as when introduced at the time of infection.

Sulfonamides given by mouth produce practically the same concentrations in blood and muscle. The authors demonstrated that much higher concentrations of the drugs can be obtained in an extremity by local introduction of the drug. Even when the area directly involved is carefully dissected away to eliminate undissolved drug, the remainder of the extremity shows a concentration many times higher than that which can be obtained by oral administration. Hence, the authors are convinced that the local administration into infected or potentially infected tissue is the most efficient method of giving these drugs. In this connection, these experiments indicate that, although sulfathiazole does not produce as high a concentration in the tissues as sulfanilamide, yet it persists much longer and at the end of twenty-four hours the concentration is much higher than that of sulfanilamide.

The authors do not advocate the replacement of serum treatment and well recognized surgical therapy by chemotherapy in gas gangrene but they do infer that chemotherapy might possibly retard this infection during the period from the infection of a wound until other treatment can be applied.

LUTHER H. WOLFF, M.D.

Gordon, J., and McLeod, J. W. The Relative Value of Sulfonamides and Antisera in Experimental Gas Gangrene. *Lancet*, 1941, 240: 407.

The authors compared the relative effectiveness of certain sulfonamides with that of gas-gangrene antisera in the prophylaxis and treatment of experimental gas gangrene. Mice and guinea pigs were used as experimental animals. The species of clostridia used were clostridia welchii, septicum, and novyi. The sulfonamides tested were the following: sulfanilamide, sulfapyridine, p-nitrobenzenesulfonamide, M & B 693. These drugs were used locally only. As other workers have shown that they are most effective when so used. Dosages of sera and sulfanilamide were used in proportions equivalent to those recommended for use in man. The gas infections were produced by injecting cultures into crushed thigh muscles in guinea pigs, and by subcutaneous injection of cultures in mice.

The experiments indicated that sulfonamides had a very limited protective value in mice. In guinea pigs, the sulfonamides apparently had a limited usefulness as a prophylactic agent, but they were much inferior prophylactically to antisera, especially in clostridium novyi infections. For example, sulfanilamide used prophylactically in clostridium welchii infections produced a survival rate of 66.6 per cent, while antitoxin protected 100 per cent. In clostridium novyi infections there were no survivals when sulfonamides were given prophylactically, and here again antisera protected 100 per cent. As a curative agent, sulfonamides were of no value whatsoever, and antisera used in doses ordinarily advocated afforded little curative influence. However, in doses from 200 to 600 times greater than the dose effective in prophylaxis, antisera gave fairly good results.

From their experiments, the authors concluded that antisera used prophylactically were far superior to sulfonamides. Very large doses of antisera were necessary in the therapy of gas gangrene, and the authors are of the opinion that antisera should be used prophylactically rather than therapeutically. It is recommended that antisera be administered by multiple injections into the muscles in the vicinity of the wound, since this method proved most effective in the experimental animal.

LUTHER H. WOLFF, M.D.

Delevski, P. S. Immunotransfusions in Acute Septicemia (Les immunotransfusions dans la septicemie aiguë). *Experimental med*, 1939, No 5/6, p. 50.

The author reports on 40 cases of early septicemia and its treatment with immunotransfusions, only

small doses (from 200 to 300 c. cm.) were given each time 1 c. 1 to 8 times. Their effect was judged by the clinical picture and by the changes that showed themselves immunobiologically for example in the coagulation mass by the amount of blood fixation in the amount of the phagocytes and in the opsonic index. In all of the author's patients these test figures were low and increased without exception after the transfusion in the patients who recovered in patients with a fatal outcome these diagnostic figures remained low. According to the author's observation the mortality amounted to 32.5 per cent. This percentage which is still quite high is low compared to that of other authors who report 42.50 and even 59 per cent.

The author concludes that of all the measures proposed for the treatment of septicemia the immunotransfusion of blood shows the best results. Even more than with mere replacement of blood the blood acts as a powerful stimulus upon the blood forming tissue with protective substances. The author also recommends that this immunotransfusion be done as soon as possible.

(Ecc. 21) LOUIS NEUWELT M.D.

ANESTHESIA

Allen J. C. and Livingston H. Postoperative Hypoproteithrombinemia and Anesthesia. *Arch. Surg.* 1944 42: 522

The authors state that in theory postoperative hypoproteithrombinemia may be the result of three factors: (1) loss of prothrombin in commensurate with the amount of blood lost; (2) damage to the liver attendant on surgical procedures and anesthesia; and (3) failure to re-establish the body's normal reserves of prothrombin or one of its precursors.

The opinion of most workers is that anesthesia by producing hepatic injury could cause a fall in prothrombin, but there are no experimental data to support this theory except cases in which chloroform was used.

Reduction of the prothrombin content of the plasma postoperatively in cases of biliary fistula or obstructive jaundice is frequently seen. That mechanical liver trauma may cause hypoproteithrombinemia is demonstrated by massaging the liver at the time of laparotomy.

Failure to establish an adequate prothrombin reserve preoperatively by means of Vitamin K and bile salt therapy is also given as a cause of postoperative reduction of prothrombin.

To date exclusion of chloroform anesthesia no definite explanation of postoperative hypoproteithrombinemia can be given. Vitamin K with bile salts therapy given preoperatively favorably influences the postoperative condition of the plasma prothrombin—the greater the amount given before operation the later the appearance of reduction after operation.

The site of storage of vitamin K in the mesenteric lymphatics of prothrombin is one of its precursors. It is

the liver as removal of that organ in the dog is followed by a sharp reduction of these elements. At present there is no experimental evidence concerning the storage of either Vitamin K or prothrombin.

Some presumptive evidence of the storage of Vitamin K or prothrombin in the body is that the longer the period of administration of Vitamin K and bile salts the longer the prothrombin could be maintained at normal levels after discontinuance of these drugs.

The authors' summary and conclusions follow:

Prothrombin studies were made on 106 patients who underwent surgical procedures exclusive of operations on the biliary tract. Except in 1 case no change was found in the prothrombin levels following these procedures when either vinethene nitrogen monoxide, ethylene oxygen, avertin with amylene hydrate, nupercal, or spinal or local anesthesia was used.

The loss of blood at operation was determined in 11 patients who underwent surgical procedures other than operations on the biliary tract. As much as 785 c. cm. of blood were lost without reduction of the level of plasma prothrombin.

Thirteen patients with obstructive jaundice and a patients with bile fistulas received preoperative Vitamin K therapy for correction of prothrombin deficiency in all but 2 of these patients. However a sharp drop in prothrombin occurred during the postoperative period despite the correction of the initial prothrombin deficiency.

The suggestion is made that some form of storage of Vitamin K or prothrombin probably occurs within the body and that the failure to replenish this store in the patient with obstructive jaundice or biliary fistula probably accounts for the postoperative hypoproteithrombinemia seen in such patients.

The postoperative hypoproteithrombinemia seen in the patient with obstructive jaundice or biliary fistula is the result of inadequate preoperative Vitamin K and bile salt therapy and not the result of the usual anesthetic agents employed exclusive of chloroform.

MATTHIAS J. SEBERT M.D.

Phillip F. Livingston H.M. and Adam W.E. A Clinical Consideration of Anesthesia in Intrathoracic Operations. *Arch. Surg.* 1941 78: 78

Major surgery within the thoracic cage is accompanied by many unusual hazards. Pneumectomy and lobectomy produce sudden changes in the lung volume. Physiological compensation takes place rapidly at the time of ligation of the hilar vessels and bronchi. Prolonged interruption of oxygenation and decarbonization of the blood produces tissue damage. The most frequently observed untoward sequelae of unimpeded oxygen want are as follows: a) a marked prolongation of consciousness; b) a bad ache; c) a rapid dyspnea; d) irreparable liver damage and impairment of function of the tissue cell.

The prebiliary and adequately maintained satisfactory surgical anesthesia and unimpaired respiration

tory function demands the skill of a well trained anesthetist who understands respiratory physiology and the specific surgical procedure, and who is able to follow the actual technical progress of the operation in close co-operation with the surgeon in order to foresee approaching crises and adjust the depth of anesthesia and pressure accordingly. At the instant of ligation of the bronchial stump and hilar vessels, alteration of the cardiac rhythm and temporary cessation of the respiration may occur, at which time the trained anesthetist can readily adjust the anesthesia to compensate for this interruption in normal cardiorespiratory function.

Proper respect for intrabronchial pressures during anesthesia is important, since high intrabronchial pressures may lead to vagal shock and result in apnea, rupture of the alveoli or lung parenchyma, spontaneous pneumothorax, or mediastinal emphysema. Maintenance of physiologically optimal intrabronchial pressures automatically minimizes laryngeal stridor and various other complications.

The choice of anesthetic for intrathoracic operations depends on the individual need in each specific case. At all times irritation of the endobronchial mucosa by chemical or mechanical agents such as ether administered through an endotracheal catheter, is to be avoided. The authors teach that an ideal anesthetic must meet the following requirements:

1. The agent should be (a) non irritating, (b) non toxic, (c) permit sufficient oxygen saturation of the blood, (d) allow rapid recovery, (e) permit a rapid return of cough reflex and (f) produce surgical anesthesia.

2. The method should (a) facilitate good exposure, (b) necessitate only minimal motion of the lungs with the least interference of the cardiorespiratory function, and (c) minimize post-operative complications.

In the clinic 92 per cent of the intrathoracic surgery has been performed under general anesthesia with the use of the mask as the method of choice and

with minimal, but adequate pressure from apparatus permitting a low positive pressure through the mask. Endotracheal anesthesia has always been available for immediate use when necessary. More recently, bronchoscopy has been employed at the end of operations to facilitate more thorough removal of secretions under direct vision, and thereby avoid the irritation and trauma of a retention endotracheal catheter.

Ethylene oxygen anesthesia is employed whenever possible because it meets the previously stated requirements and produces few complications following its correct administration. It was used in 54.0 per cent of this series of 102 intrathoracic operations. In 2, 5 per cent of the cases, ether supplemented the ethylene oxygen mixture to provide more relaxation. In a few cases in which cauterization became necessary, a change to a non explosive agent, nitrous oxide oxygen, was made during the operation. Most of the extrapleural pneumonolysis cases received nitrous oxide oxygen alone because of the use of the cautery, this was supplemented by the use of procaine on the pleural dissecting sponges to minimize the stimulation.

In 4 patients veritin was used as a basal anesthetic and supplemented with nitrous oxide oxygen. Local anesthesia was used in 8 patients since the patients' conditions made inhalation anesthesia undesirable because of markedly impaired cardiorespiratory efficiency. Barbiturates were given routinely by mouth the night before, and again by rectum about one hour preceding the operation. If cough was severe, codeine and occasionally morphine were given hypodermically. Atropine has been discontinued because of the possibility of post-operative atelectasis and tachycardiac complications. A wide variety of intrathoracic operations is presented with a description of the anesthetic agents used and the type of operation performed. The complications, deaths, and end results are fully discussed.

JOHN I. KIRKPATRICK, M.D.

PHYSICO-CHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Clark K. C. Cordiner G. R. M. and Ellm n. P.
Experiments in X-Ray Screen Photography
with Control Direct Roentgenographs *B. I. J.*
Radiol. 94: 4 54

The development of roentgen ray screen photography is reviewed briefly and attention is called to the field of usefulness and limitations of this method of examination. In order to ascertain whether conclusions based on it can compare favorably with those obtained by the ordinary roentgen examination the authors made comparative studies of both normal and diseased individuals. They stress the fact that a technically satisfactory miniature is no less important than a similar full sized direct roentgenogram for correct interpretation. By collaboration they decided upon a suitable type of negative to meet the requirements for correct interpretation and developed a technique by which it could be produced. This is described in detail.

In studying the cases examined the procedure adopted was to make a diagnosis from a projected miniature and to indicate those cases in which a direct roentgenographic examination was in their view advisable. The full sized negative of each case was then examined and the findings compared with those of the miniature examination. The findings in 80 cases subjected to this procedure are tabulated.

The findings of the 2 examinations were identical in all but 8 of the cases. In only 1 of these 8 cases the direct examination revealed a lesion unsuspected at the miniature investigation. In 4 of the cases the full sized negative proved the presence of a lesion suspected on the miniature but in 2 of the subjects these were regarded as being probably normal at the miniature examination. In the 3 remaining cases a suspected Assmann focus was confirmed on the full sized negative. The presence of an active lesion was disproved and the exact nature of an unidentified lesion was revealed by the direct method.

In this study the importance of the use of the method in mass surveys for the detection of early pulmonary lesions in asymptomatic subjects and its possible extension to the sphere of cardiology is indicated.
WOLFE H. STUNG M.D.

Gillan R. U. The Experimental Roentgenography of Small Fragments of Glass in Relation to the Human Eye *B. I. J. Ophth.* 94: 25 7

The present war time conditions which so often result in injury of the eye by glass particles have induced the author to carry out a series of experiments on the roentgen visibility of glass foreign bodies. Especially since the prevailing opinion seems to be that only the glass containing radiopaque and not the other kinds

Fourteen specimens were chosen from glasses most commonly in use namely various window glasses spectacle glass glasses used in motor car windcreens and bottle glass. They are tabulated as follows

- | | |
|---------|-------------------------------------|
| Group A | 1 24 oz clear |
| | 2 in polish plate |
| | 3 4 in rough roll |
| Group B | 4 Crown spectacle glass |
| | 5 Crooke glass A 2 |
| | 6 London smoke glass |
| | 7 Salvoc safety glass |
| | 8 Welders blue |
| Group C | 9 Toughened safety glass (Triplex) |
| | 10 Laminated safety glass (Triplex) |
| | 11 Armour plate glass (Pilkington) |
| Group D | 12 Green bottle glass |
| | 13 Brown bottle glass |
| | 14 White bottle glass |

A piece of each of the specimen glasses was taken in turn shattered between two layers of gauze by a wooden mallet and 3 fragments were carefully selected measuring as nearly as possible in thickness 2 mm 1 mm and 1/2 mm respectively. These fragments were placed at equal distances on a small square of dental wax and first fixed against the closed eyelids by means of a bandage. Roentgenograms were made in this position with the subject's head facing downward the central ray passing above the occiput. Then the wax was placed agglutinated in such a way that the 3 fragments were in close apposition to the inner aspect of the open eye. Additional roentgenograms were made in dental film which were positioned on the nasal side the central ray being directed from the temporal side so as to obtain a bone free image of the eye.

The result of the experiments was the discovery that the fragments of all glass specimens cast roentgen shadows both on the posterior anterior and on the lateral films. The 2 mm pieces showed most clearly whereas the 1/2 mm pieces were at times rather difficult of detection in the posterior and inferior exposures.

The conclusion was reached that most kinds of glass in common use are radiopaque and that the detection on by exacting roentgen examination may be expected.
T. LEITCH M.D.

Mast R. A. M. Roentgen scopy as a Diagnostic Aid in Corneal Occlusion. A Study of 164 Cases *Am. J. R.* 45: 94 45 359

The author states that roentgenography is a simple inexpensive and reliable means of diagnosing corneal occlusion and should form part of the examination

nation of every suspected case. This article is based upon a study of 300 patients of whom 164 had suffered an occlusion and the remaining 136, who had various other lesions, were used as controls. The technique used is described in detail. Normal movements and types of abnormal pulsation are discussed and illustrated diagrammatically.

In 70 of the 164 cases of coronary occlusion complete or partial systolic expansion or reversal of pulsation was observed and in 30 diminution or absence of pulsation. Thus, ventricular contraction was abnormal in 67 per cent of the series. Reversal of pulsation, which probably occurs in more than half of the cases, is far more characteristic of myocardial infarction than either absence or diminution of pulsation. The findings in the control cases are also given consideration. An attempt made to correlate the location of the lesion as determined by electrocardiography with the pulsation changes observed fluoroscopically failed to show any constant relationship. The incidence of abnormal pulsation in coronary occlusion was found to be greater when the heart was enlarged. When the area of abnormal pulsation was large the prognosis was poor. Systolic expansion may appear directly after the coronary occlusion and persist for many years. Its disappearance or a change to absence or diminution of pulsation is of favorable significance.

In his summary the author states that systolic expansion (reversal of pulsation) of the left ventricle observed in 50 per cent of these cases is characteristic if not pathognomonic of myocardial infarction. "Lag" and "doubling" of pulsation are incomplete forms of systolic expansion. Systolic expansion is seen in practically every case of large heart with ventricular aneurysm. Absence and diminution of pulsation were present in 25 per cent of the cases with coronary occlusion, but also occurred in other types of heart disease.

ADOLPH HARTUNG, M.D.

McCullough, J. A. L., and Sutherland, C. G.
Intra-Abdominal Calcification, the Interpretation of Its Roentgenological Manifestations
Radiology, 1947, 36 450

Deposits of calcium in various tissues of the abdomen are frequently noted as incidental findings in the course of roentgen examinations. Some of them appear in sufficiently characteristic shapes and positions to leave little doubt as to their origin, whereas the interpretation of others may tax the ingenuity of the trained radiologist. Their evaluation may be of the utmost importance and provide the clue to the diagnosis. They must be differentiated from certain simulants and artefacts which are sometimes found and which may be confusing.

Pathological calcification may occur in any mesenchymatous tissue of low metabolism or decreased blood supply, or following the fibrosis of trauma or infection. Similarly, the calcification of tumors is observed when the blood supply is so impaired that degenerative changes have appeared, as

is seen in uterine fibroids and in the fibrous walls of cysts and blood vessels.

The abdominal field is analyzed in four fields in regard to the significance of calcifications which may occur in them. In the right upper quadrant deposits in the renal and biliary tracts, pancreatic, adrenal, subdiaphragmatic and paravertebral areas are given consideration. Their appearance, location, and the special procedures indicated to identify them are discussed in detail.

Certain of the lesions described in connection with the right upper quadrant are not confined to the right alone, but may be found in the left upper quadrant. Apart from these, the most common site of calcium deposit in the left upper quadrant is the spleen. Calcification of the splenic artery may cause some difficulty in interpretation. The vessel may be seen end on and appear as a ring of calcium with a clear center.

In the right lower quadrant the most common type of calcium deposit apart from those in renal lesions is that in the mesenteric nodes. Another type of paravertebral calcification is that which occurs following suppurative processes of the lumbar or lower thoracic vertebrae, as in tuberculosis or typhoid spondylitis. Similar findings may occur to the left of the spine. Calcifications in the blood vessels and in the ilio-lumbar ligaments may also be noted in these regions. Foreign material in the appendix may simulate calcium deposits. Calcified epiploic appendages are also given consideration; they may appear as loose bodies in the pelvis.

Probably the most common type of calcification in the pelvic region is that which occurs in the blood vessel walls or as phleboliths. Urinary concretions, prostatic stones, calcified leiomyomas, and calcification in ovarian cysts, pyosalpinx, seminal vesicles, and ducts are all discussed. Special diagnostic characteristics of dermoids and teratomas are mentioned. Attention is called to the frequent presence of shadows of residue of foreign material, such as bismuth in the gluteal regions.

ADOLPH HARTUNG, M.D.

Golden, R. Abnormalities of the Small Intestine in Nutritional Disturbances. Some Observations on Their Physiological Basis. *Radiology*, 1947, 36 262

In this article the author discusses the disturbances in the physiology and morphology of the small intestines which are associated with abnormal nutritional conditions, and their manifestations on roentgen examination. The literature relating to the subject is reviewed and brief mention is made of the technique of examination. Deficiency states are divided into two broad groups: primary, those arising without obvious anatomical cause and secondary, those in which the condition is caused by, or at least associated with, disease of the gastrointestinal tract which may interfere with the digestion or absorption of nutriment. Detailed information of the anatomy and physiology of the small

intestine: pre- and roentgen manifestations of it are described. Pathological changes produced by deficiency states are discussed in connection with the gross pathology and pathology of the mucous membrane, submucosa, muscularis and intramural nervous system. Brief consideration is also given to clinical manifestations.

Roentgenologically deficiency states affecting the small intestines manifest themselves in the following manner:

1. Variations in intestinal motility in the nature of hypermotility and hypomotility; changes in the intestinal tone resulting in dilatation, particularly in the jejunum and interceptions of the continuity of the barium column which result in abnormal segmentation.

2. Variations in the normal mucosal pattern in the nature of coarsening and obliteration.

3. Variations in the secreting and absorbing powers of the small intestines resulting in abnormal flocculation of the barium shadow.

Permanency of the changes noted depends on the severity and duration of the condition. Irreversible changes occur if the condition lasts long enough.

The clinical material which served as a basis for this study is reviewed, and 4 case histories are cited in detail with discussions of them. Included are numerous roentgenograms and photomicrographs which illustrate findings considered more or less characteristic. Possible physiological mechanisms responsible for the findings are discussed and evidence tending to corroborate them is presented. Interference with or damage to the intramural nervous system is considered to be the most likely factor.

In conclusion the author states that deficiency states might be recognized more readily if adequate importance were attached to findings from properly conducted roentgen studies of the small intestines. Careful roentgen observations and correlation with clinical and pathological evidence in individual cases will assist in advancing knowledge of deficiency states and their differential diagnosis.

ANDERSON, H. T. M.D.

Archer V. W. and Cooper G. Jr. Intra Abdominal Hernia or Intestinal Incarceration: Two Verified Cases. Pre-Operatively Diagnosed. *Radiology* 94: 36-48.

The pre-operative diagnosis of an abdominal hernia possible only by roentgenological study is rare; only 4 cases having been reported according to the authors. They briefly review the literature relating to the condition and give some of the theories advanced as to its causation. However, formed there is an abnormal opening in the region of the duodenojejunal flexure leading into a peritoneal sac which is capable of receiving varying lengths of the small intestine. The opening into the sac may lead as it usually does to the left with the major portion of the sac lying to the left of the midline. In about one third of the cases the sac is to the right. The

symptomatology in the reported cases has not been constant.

In this communication 2 cases diagnosed pre-operatively and confirmed are added to the literature. In both the sac was on the right side. One case presents the anatomy usually described; the cases previously reported as paraduodenal hernias except that failure of descent of the cecum was associated with the hernial sac. In the other case there was no true hernial sac present. The cecum, the ascending colon and the hepatic flexure were attached by a true mesentery which formed a sac only when this portion of the colon was carried medially. Details of both cases are included.

In the discussion the authors call attention to the need for short interval roentgen examinations of the small intestine until all of it has been outlined when there is a history of discomfort following eating after an interval of an hour or so which is unrelieved by soda and particularly when it is associated with nausea or vomiting with no demonstrable lesion; the esophagus, stomach or duodenum. Putting together of loops with fixation of the coils is of diagnostic importance. The advisability of study in an attack if possible is mentioned because incarceration in a false sac may be self-reducible.

ANDERSON, H. T. M.D.

Axel O. The Value of Arthrography of the Shoulder Joint. (*Ueber den Wert der Arthrographie des Schultergelenkes*). *Acta radiol.* 1941, 2: 68.

While roentgenography explains possible bone changes, fractures, luxations and subluxations, it affords no conception regarding the humeroscapular joint itself and particularly not regarding the joint capsule and its conditions. To overcome this difficulty a certain method of examination was tested in 118 men and 55 women since 1938 at the Serafimerlasarettet in Stockholm.

The technique includes the injection of a contrast medium under roentgenographic control. The patient is put in the dorsal position with the arm adducted 90 degrees and rotated outward. An injection of 90 aethocain is made 1 cm anterior to the acromioclavicular joint with the needle pointing in the direction of the upper arm until the point of the needle is against the head of the humerus. The needle simultaneously with pressure upon the piston is then withdrawn a few millimeters. If the point of the needle is in the joint the piston is felt to enter the syringe easily. Without change of the position of the needle the syringe with a theocaine solution of one containing 35 percent parabromol and from 6 to 8 cc of the drug are injected. It is important that the point of the needle be grounded transversely so as to prevent the contrast medium from entering the joint and the subacromial bursa simultaneously. After the injection of the contrast medium the shoulder joint is subjected to a few passive motions so as to spread the medium.

The posture is first made in the dorsal position, some with the arm adducted and rotated inward



Fig. 1

Fig. 2

Fig. 1 Small rupture of the lateral portion of the tendon aponeurosis (x) with a smaller amount of the contrast medium in the subacromial bursa. Also a rupture of the lower part of the joint capsule (xx).

Fig. 2 Arm rotated outward. At x a distinct complete rupture of the anterior lateral part of the aponeurosis with contrast medium in the subacromial subdeltoid bursa.

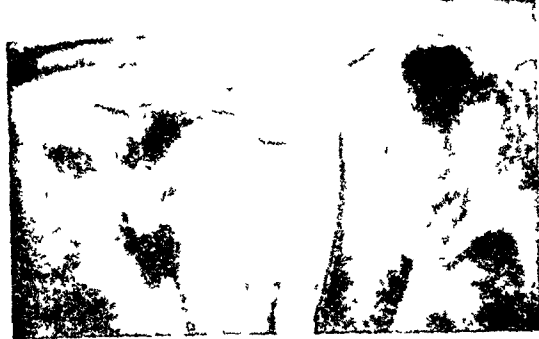


Fig. 3

Fig. 4

Fig. 3 Rupture of the intra-articular part of the long tendon of the biceps. At x the deformed intertubercular sheath filled with contrast medium.

Fig. 4 Rupture (x) of the lower part of the joint capsule, abundant amounts of the contrast medium in the soft parts below the joint. Also avulsion of the greater tuberosity.

and some with the arm rotated outward about 90 degrees. The ray projection is 25 degrees caudad. An exposure is also made with the arm abducted and rotated outward 90 degrees. The ray projection is 10 degrees caudad. The latter projection is not always possible because of rigidity of the axillary joint. The patient is then examined in the standing position with the fluoroscope to determine the distribution of the contrast medium, in this way it is possible to place the patient in such a position that the area above the joint is projected freely and pathological changes may be demonstrated by different positions of the arm. No complications from this technique were noted. If the contrast material enters the tendon aponeurosis or soft parts, moderate pain is felt. An element of danger, which must be avoided is the breaking of the needle during the injection. This occurred once.

If there is a break in the continuity of the tendon aponeurosis, so-called supraspinatus rupture, a communication is found between the joint and the subacromial bursa. A break in the continuity between the shoulder joint and this bursa can always be determined indirectly by the passage of the contrast medium into the bursa when the joint is injected.

The ruptures may be classified as follows: (1) incomplete ruptures, which extend slightly from the inner side of the aponeurosis into the tendon (Fig. 1), and (2) complete ruptures, which penetrate the aponeurosis completely and lead to a communication between the joint and the bursa (Fig. 2). With incomplete ruptures the site of rupture itself is roentgenologically demonstrable with very great difficulty, a collection of contrast material is seen only in the tendon aponeurosis and medially inward against the site of the supraspinatus muscle. The complete ruptures show transitions of transversely running tears with ragged edges up to round or rectangular holes with sharp, smooth edges, and also slit-shaped prolongations in the longitudinal direc-

tion of the tendon. In the latter types it is impossible to demonstrate the communication itself. If the transverse rupture is large anteroposteriorly, it is considered a total rupture, this is easily demonstrable. A retraction of the rupture edges and a broad communication is always seen.

The clinically important question arises: Does a roentgenographically demonstrable communication between the joint and the subacromial bursa always denote a traumatic injury of the tendon aponeurosis with subsequent clinical symptoms, or can such a communication be present without a known trauma and without clinical symptoms? By examining the normal joints of persons who had sustained injury of one shoulder joint, it was found that in 2 of 17 men, aged from twenty-nine to seventy-three years, a communication between the bursa and the joint was present, while in 11 women, from forty-three to seventy-two years old, who were examined, 4 cases were found. In 1 case the injured shoulder joint showed no change arthrographically, whereas the so-called normal joint showed a communication between the bursa and the joint. In the remaining cases the communication was bilateral.

Arthrography can also give valuable information regarding the condition of the shoulder joint, as in 2 cases of rupture of the intra-articular portion of the long tendon of the biceps (Fig. 3). With anterior luxations in the humeroscapular joint there often are ruptures of the lower capsular recess with escape of the contrast material into the soft parts below the joint (Fig. 4). In a case with habitual luxation of the joint, a residual cavity communicated with this rupture and represented the site of escape of the head of the humerus.

The relationship between a trauma and a demonstrable communication between the joint and the subacromial bursa must be assessed carefully in patients over fifty years of age, as it has been shown

that such may be present without a known trauma and without clinical symptoms. An examination of the so called normal shoulder joint is of value in such cases as a communication present on this side between the joint and subacromial bursa indicates that the tendon aponeurosis was the bilateral seat of changes even before trauma. LOUIS VETZWEIT MD

Widmann B P Radiation Therapy in Cancer of the Skin *Am J Rtg* 94: 45 382

A procedure for treating cancer of the skin with low voltage (75 to 135 kv) roentgen rays or radium which the author believes is simple, speedy, effective and economical is presented. Attention is called to the wide variations of technique reported by different authors and the expediency of establishing a predetermined dose that will allow for differences of sensitivity or resistance is stressed. The various factors entering into dosage considerations are discussed at length and numerous authors are quoted to indicate the existing variations in what is considered a skin erythema dose.

In the author's technique total doses are recorded as roentgens. The skin erythema dose is arbitrarily considered as equivalent to 500 roentgens. This establishes a basic biological skin unit multiples of which constitute the total dose of roentgens. The skin unit of 500 roentgens is regarded as uniform for all surface areas of a neoplastic mass of from 0.5 to 20 cm in diameter because the commensurate increased infiltration value of the bulk of tumor thickness of large lesions compensates for the actual physical difference. The size of the lesion is considered only as to the approximate bulk or thickness—a shallow lesion is less than 0.5 cm in elevation above the surrounding normal skin surface, a large or fungating lesion is more than 0.5 cm in elevation.

For shallow lesions three treatments of 1000 roentgens are given every other day. A liberal margin of surrounding skin includes a filtration of 1 mm of aluminum is recommended for the second and third treatments. If within from two to six weeks there is definite or a suggestion of residual disease then additional treatment with 1000 roentgens is given and sharply localized to the actual or suspected residual thickening. The reactions resulting from these doses are described. The need for variations in the technique are also mentioned.

For large or fungating lesions three treatments of 1500 roentgens are given once every other day. Additionally sharp localized doses of 1000 roentgens are given to any suspected residual disease that may appear within from two to six weeks or to the entire original area of involvement if necessary. The rationale of both plans is discussed and possible developments requiring modifications or additions for obtaining desired results are mentioned.

Radium technique for shallow and small lesions involves the administration of the full dose of 5000 erythema doses at one sitting. If the lesion is infiltrating a procedure similar to that used for large fungating lesions with roentgen rays is utilized.

A routine experience of ten years at the Philadelphia General Hospital has demonstrated an almost uniform applicability of the technique to all sizes and cellular types of lesions and that it provides a fundamental and concrete working basis from which changes may evolve to meet the exigencies of particular problems. ADOLPH HARTUNG MD

Kiskree L Roentgen Ray Treatment of Actinomycosis (Röntgen behandelung der Aktinomykose) *Exl* 4: 1940 9 189

The author reports on 150 cases of actinomycosis which he treated with roentgen irradiation omitting surgical intervention and potassium iodide therapy. Surgical operation (deep incision and scraping) as well as the internal administration of potassium iodide are ineffective or impair the result of roentgen irradiation. Seventy per cent of the patients treated were cured with from one to three series of irradiation while the remainder required from four to seven series. Of 120 cervicofacial cases 97 were cured, 10 ended fatally, 5 were still under treatment and 8 were unreported. Of 17 abdominal cases 9 were cured and 6 ended fatally. Of a group of 11 patients with thoracic abdominal actinomycosis only 3 were cured and 8 died.

The use of weaker doses of x-rays showed good results in the cases in which treatment was given in the early stages. In order to reduce the mortality rate from actinomycosis all patients must receive roentgen ray treatment within the day which implies an early diagnosis (W. PLATT) HILDA H. WHELER.

Ebenius B P Oral Roentgen Treatment of Malignant Tumors of the Oral Cavity 1941 2 94

Malignant tumors of the oral cavity and throat suitable for roentgen therapy are as a rule irradiated externally through the skin and other tissues with the use of a number of fields of entrance. This implies that the large parts of the oral cavity and throat become irradiated which causes considerable discomfort to the patient particularly in the reactive stage. The simultaneous ingestion of toxic epithelitis is a detrimental effect on the general health by hampering nutrition and bronchopneumonia may sometime develop. With large tumors these disadvantages cannot be avoided. In the case of small tumors however it is sometimes possible by the local application of radium or by combination with a surgical procedure to achieve a local effect of a therapy more gentle toward the surrounding normal tissues.

Recently however the method of intracavitary application of radium has been found in creating a plan of treatment for the irradiation through a jejunally inserted cylinder of metal or other appropriate material. The method proposed makes possible the local treatment of a limited area with precision of the surrounding normal tissue desired irradiation which fulfills the requirements of a form of therapy as gentle as possible for the patient. This method is now well known as it was first described in 1903 by Brückner.

but it did not become popular, probably due to purely technical difficulties

Since 1936 peroral roentgen treatment has again begun to be used at the Radiumhemmet and the author constructed for this purpose a device which has now been tested out for about five years and has shown itself suitable. The problem of fixation has been solved as follows. After the end of the peroral cylinder has been remodelled with the help of a scissors or knife so that it is adapted to the area to be treated, a suitable amount of warmed dental compound is fastened on the places corresponding to the site of the teeth and alveolar protuberances. While the compound is still soft, the cylinder is placed in the desired position and when the patient then bites, an impression is obtained of the teeth or jaws. A last adjustment is made before the mass has completely hardened. The cylinder is then ready for use.

Since 1936 about 70 patients have been treated at the Radiumhemmet in accordance with this method. The material consisted of cases with tumors inside of the cheeks, on the alveolar ridges, on the hard and soft palate, in the sublingual region, on the tongue, in the tonsillar region and in the mesopharynx and nasopharynx.

The indications for peroral roentgen treatment are as follows. The tumor should be so situated that the peroral cylinder can be directly applied to it (the nasopharyngeal tumors are, of course, an exception). Also, tumors of the base of the tongue and the lower part of the mesopharynx are therefore not accessible to this form of therapy. Among tumors of the oral cavity, those of the tongue are the least suitable for peroral treatment because of the mobility of the tongue and the fixation difficulties associated with this feature. The size of the tumor is also decisive as to the applicability of the method. As cylinders of greater diameter than from 4.5 to 5 cm. usually cannot be introduced perorally, the upper limit for the size of the tumor may be set at a diameter of from 3 to 3.5 cm. The tumor should be well demarcated, otherwise there is a chance that some portion will not be irradiated. The width of the mouth and mobility of the jaw articulations are also significant factors. In doubtful cases it is preferable to select some other irradiation technique than the peroral.

Even if peroral roentgen treatment has a relatively limited field of applicability, it is nevertheless, if rightly managed, a particularly valuable method which deserves greater application than it now seems to have.

JOSEPH K. NARAT, M.D.

Schenck, S. G. The Management of Cancer of the Breast with Pre-Operative and Postoperative Irradiation. *Radiology*, 1941, 36, 315

The statistics of the incidence and mortality rate of carcinoma of the breast are briefly considered. The clinical and microscopic grading of carcinoma of the breast is also discussed.

Immediately after clinical diagnosis of carcinoma of the breast, and before the report of the biopsy is

received, Schenck administers a course of roentgen therapy. The entire breast is cross-fired through two tangential ports in such a manner that the underlying lung is avoided. Two hundred roentgens are given daily to each portal until a total of from 2,000 to 2,600 roentgens is reached. The factors used are 200 kV, 50 cm. distance, 2 mm. of copper and 1 mm. of aluminum for filters. The axilla is cross-fired through anterior and posterior ports or is treated directly through one field. From 1,200 to 1,800 roentgens are given to each port if two are used and from 1,200 to 1,400 are given into the axilla if a single port is used. The daily dose is 200. The technical factors are unchanged. Finally the same technical factors are used and 200 roentgens are given daily until a total of from 1,600 to 2,000 roentgens have been administered to the supraclavicular fossa. The erythema which appears shortly after and sometimes before completion of treatment to each port goes on to blistering and sometimes to almost complete denudation of the epidermis. The roentgen treatment is completed in from twenty-seven to thirty-three days. About eight weeks after the last treatment the patient is subjected to a radical mastectomy.

In 33 per cent of 200 cases of breast carcinoma which were subjected to pre-operative irradiation, Adair reported total destruction of the primary tumor and in 22 per cent of the axillary extension. The author has never seen the tumor mass increase in size during therapy. The results of pre-operative irradiation have been most gratifying in patients in Stage 2. Irradiation has increased the percentage of five-year cures to 57, with operation alone, only 28 per cent of the patients have survived five years without evidence of the disease.

From four to six weeks after operation, a series of postoperative treatments is given. This course is similar to the pre-operative treatments, except that the dosage is kept within the lower limits. The anterior chest wall is treated by tangential rays, and the entire scar is included within the field of irradiation. If for any reason pre-operative irradiation was omitted, postoperative therapy is given about two weeks after surgery. It is unnecessary to delay treatment until the wound heals completely. The patient is examined semi-monthly for three or four months, and then at monthly intervals, for the possibility of regional recurrence or metastases. In addition, Schenck has recommended the induction of an artificial menopause by irradiation to all menstruating patients with breast carcinoma. Sterilization is accomplished by giving from 500 to 600 roentgens to two anterior or lower abdominal ports and two posterior or sacral ports. The factors are 200 kV, 50 cm. distance, and 0.5 mm. of copper and 1 mm. of aluminum for filters.

The technique outlined is adaptable in Stages 1 and 2 of breast carcinoma. Patients in clinical Stage 3 are chiefly a radiological problem. Pre-operative radiation adapted to the individual is followed by conservative surgery or radium therapy. Further

roentgen therapy may be given for the relief of pain and discomfort. Recurrent or clinical Stage 4 cancer is treated with x rays, radium or both.

HAROLD C. OCHS, JR., M.D.

Strandquist M. Trans thoracic Roentgen Treatment of Cancer of the Esophagus. *Acta radiol.* 1943; 3: 72.

The author gives a detailed account of 36 patients treated with roentgen irradiation for cancer of the thoracic esophagus. He describes a special focusing technique for trans thoracic cross firing and stresses the importance of a rational tumor dosage. He also describes the accidents and complications of the treatment and discusses the results in relation to the daily and total tumor dosage.

Although lasting results seem to be very rare, 4 two year cures and good palliative results are a stimulant to further attempts.

The author concludes by emphasizing the desirability of every clinic reporting its cases with detailed information as to the daily and total tumor dose, expressed in tissue roentgens and the number of treatment days, in order that experience in regard to the ideal tumor dosage be enlarged.

JOSEPH K. NAKER, M.D.

Walters R. I., Bachman A. L. and Harris W. The Treatment of Carcinoma of the Ovary. Intraperitoneal Radium with Postoperative Radiotherapy. *Am. J. Surg.* 1944; 45: 403.

The authors' findings and studies of other investigators indicate that postoperative radiotherapy effects a noteworthy improvement in results obtainable in the treatment of carcinoma of the ovary. The authors present a review of the literature and observations on 24 additional cases treated by surgery alone or by surgery plus radiation therapy.

Failure to classify cases according to the stage of progression has made evaluation of the early reports difficult. The material on which this report is based is grouped in this manner. The studies agree with reports of other investigators that surgery alone gives results comparable to surgery plus postoperative irradiation in Stage I. In Stage II, however, postoperative radiotherapy definitely improves the results. The value of postoperative radiation therapy in those cases of ovarian carcinoma in which part of the disease remains following surgery (Stage III) is also tabulated. The increased number of five year survival in the irradiated group appears to be of statistical significance. In a combined series of various investigators, 150 cases of Stage IV ovarian carcinoma treated by postoperative radiotherapy showed that 9 patients (6 per cent) had survived five years. This result represents a distinct improvement over that obtained in the non-irradiated group.

The procedures follow a combination with the cases as they are recorded by the pathologist and therapy. The results are tabulated according to the year survival with surgery alone with opera-

tion plus inadequate roentgen therapy with operation plus indeterminate irradiation and with surgery plus adequate roentgen therapy. The prognostic value of morphological classification and histological grading of malignancy was also investigated. Conclusions reached from these comparative studies are presented and discussed.

Surgery alone has been repeatedly shown to be most effective in the localized unilateral cases. The value of postoperative radiotherapy is apparent in all reported series. Its relative importance and effectiveness increases proportionately with the stage of progression of the neoplasm. To be effective radiotherapy must be given in adequate amounts. Stage IV cases which offer a poor prognosis under any form of treatment should whenever feasible be given the benefits of maximum dosage. If operation is considered in these cases pre-operative irradiation is advocated. ADOLPH HARTING, M.D.

Hilme B. E. Serum Cholesterol and Irradiation. *Skand. J. Med. Biol.* 1944; 3: 374.

The occurrence of sickness and other unfavorable reactions after roentgen therapy is no longer a major problem but the author believed that the volume of literature on the subject of changes in serum cholesterol values justified further investigation. A number of authors particularly Burghel observed in some cases a sharp fall in the serum cholesterol after x-ray treatment which was followed by vomiting. No fall in the serum cholesterol had been reported in patients not suffering from unfavorable symptoms. Burghel had also obtained good results by giving cholesterol as a preventive of x-ray sickness.

The investigations of the author involved daily irradiation of a series of cases for a given period and collection of blood samples before and after the first two irradiations of such a series. It was found that the most usual reaction to the first and often to the second irradiation was a considerable rise in the serum cholesterol. Such a rise did not appear in 4 cases in which vomiting occurred but there was a considerable fall. There was not necessarily a direct relationship between the fall of the serum cholesterol and the onset of symptoms. In 1 case the fall in serum cholesterol did not occur until after the second irradiation when a vomiting began after the first irradiation in another instance there was vomiting nearly twenty-four hours after the first irradiation when the serum cholesterol value had returned to normal.

It is concluded that there may be a tendency to lowering of the serum cholesterol value in patients liable to x-ray sickness. Any direct relationship between the amount of cholesterol in the serum and the symptoms involved in x-ray definite relationship between the two cannot be substantiated. It is believed that some factor concerned with the production of the symptoms may also tend to produce a change in the metabolism which influences cholesterol from the blood.

HAROLD C. OCHS, JR., M.D.

RADIUM

Kjellberg, S R Radiological Treatment of Epulis
(Radiologische Behandlung von Epuliden) *Acta
radiol.*, 1941, 22 202

Kjellberg surveys 109 cases of epulis treated radiologically in the Radiumhemmet in Stockholm, Sweden, in the period from 1922 to 1938. In accordance with the findings of other investigators, he found a slight prevalence of the lower jaw as a tumor site, that the ages of the patients ranged from twenty to forty years, and that the ratio of females to males was 2.4 to 1. In all of the cases there was clinical and histological benignity, but a tendency toward local recurrence. Histologically, the fibromatous, angiomatous, mesenchymal tumors without giant cells were differentiated from mesenchymal tumors with giant cells. Two cases could not be classified in any of the above groups, as there were adamantinoma-like pictures in one, and plasmocytosarcoma-like structures in the other. Both, however, responded well to the treatment. The etiology of epulis is not established. Kjellberg is inclined to believe in the theory that infection is the main cause.

Except for 4 cases which were treated with roentgen rays (1,500 roentgens in 5 doses of 300 roentgens each through 0.5 mm of copper and 1 mm of aluminum, with 170 kv), Kjellberg's patients were treated with radium. Radium treatment consisted either of teleradiotherapy, with a distance of 6 cm from the radium (3 or 5 gm of radium element in the form of radium sulfate given through a filter equivalent to 6 mm of lead) to the skin. Usually a skin dose of from 2,700 to 3,600 roentgens was given. This treatment was followed by a second shorter teleradium treatment or by an application at close range if the first treatment was not fully successful. Brachyradiotherapy was carried out by implanting needles containing about 10 mgm of radium element in one or several rows with a distance of 5 mm between each two needles, and a filter corresponding to 0.5 mm of lead. From one to seven needles were used, according to the size of the tumor. The duration of a treatment was from two to four hours. Superficial application was done by means of either the same needles or tubes containing 10 mgm of radium element with a filter corresponding to 0.6 mm of lead, or with a combination of tubes and needles. They were mounted in a dental plastic compound mass. A distance of 1 or 2, even occasionally 5 mm, was maintained between the tumor surface and the radium carrier. Usually, the tumor was removed after the insertion of radium to its base.

Histological studies showed that the vascular tumors were more radiosensitive than the rest. They disappeared within two months, while the other types did not disappear before one half or even a whole year. Occasionally, there was an incipient enlargement for two or three weeks after the radium treatment, followed by shrinkage and disappearance. Surgical removal after radium treatment led to quicker healing than the radium treatment alone.

Of the 109 patients treated, 59 showed a five-year cure, 21 have been symptom-free for from three to five years, and 19 for from one to three years, but these were all recent cases. Four of the remaining patients were operated upon very recently, 2 are dead, 2 are lost, and 1 cannot have further treatment for external reasons. In 9 patients there was a recurrence after the radium treatment. Thirty-one of the patients had undergone surgical treatment for epulis before they received radium therapy, and 13 of these had recurrences also after a second operation, 5 after a third, and one even after a fourth operation. Six of these 31 patients had recurrences also following radium treatment.

HERNICH LAMM, M D

Schmitz, H E., and Sheehan, J F Five-Year
End-Results in Cervical Carcinoma Treated
with Radium and 800 Kilovolt Roentgen Rays
Am J Roentgenol., 1941, 45 229

Since May, 1933, supervoltage roentgen therapy was used at the Mercy Hospital Institute of Radiation Therapy of Chicago, first with 500 kv and later with 800 kv.

The technical factors, briefly, were 800 kv maximum obtained from a double pulsating Villard circuit of 10 ma, a roentgen tube continuously evacuated by oil pumps, water-cooled tungsten target, 10 mm of copper-equivalent filter, 70 cm of focal skin distance, and $\frac{1}{2}$ value layer of 8.2 mm of copper corresponding to an average wave length of 0.0128 Angstrom unit. The output of the tube was 36 roentgen/min without backscatter and 44 roentgen/min with backscatter, and the depth dose at 10 cm amounted to 54.5 per cent if the field was from 300 to 400 sq cm. The amount of radiation required to produce a tolerant skin dose with 800 kv was 4,000 roentgens if applied in 10 fractions at 48-hour intervals.

In treating carcinoma of the cervix uteri, two portals of entry were used for the purpose of cross-firing if the anteroposterior diameter of the pelvis was 24 cm or less, and three or more portals if the diameter was greater than 25 cm. The mid-pelvic dose attained about 4,000 roentgens. In addition to this, 4,500 mgm hours of radium were administered in 3 doses of 1,500 mgm hours each, given at weekly intervals.

Following such treatment, the local reactions of the skin and mucous membranes, as well as the changes in the blood, were examined, and by running serial sections the microscopic changes of the tumor and the changes in the fibromuscular coat of the cervix were studied.

The changes noted in the carcinomas included (1) swelling of the cytoplasm and nuclei of the tumor cells, (2) loss of regularity in the pattern of the tumor, (3) increasing cornification, (4) relative increase in abnormal mitoses and increase in the number of cell monsters, (5) obliteration of the boundaries of cells, (6) bizarre nuclear forms, (7) karyolysis, (8) pyknosis, (9) neutrophilic infiltration in

partially or completely cornified masses of cells (10) foreign body giant cells (11) fine and coarse vacuolation of the tumor cells (12) decrease in the size of sheets of tumor with relative increase in the amount of stroma.

The changes in the fibromuscular coat of the cervix included (1) surface ulceration with necrosis and neutrophilic infiltration (2) a zone of edema beneath this layer (3) swelling of the collagen and ultimate hyalinization (4) necrosis of the capillary endothelium and the walls of the arterioles with thrombosis (5) swelling of collagen and hyalinization in the subendothelial tissues of the walls of the small arteries (6) atrophy of smooth muscle.

Generally it was found that whereas the above said type of radiation has with the doses given a lethal effect on the cancer cells the effect on the normal structures such that a recovery of the normal structure follows within about four to six months.

In 26 cases of primary carcinoma of the cervix which were treated during the years of 1933 and 1934 the five year survival ratio was as follows:

TABLE I—SURVIVAL RATE

Clinical group	I	II	III	IV	Total
No. of cases	2	0	14	2	
No. of patients surviving 5 years	2		7	1	(47 per cent)

Although the total number of cases is small a comparison with a smaller group of cases treated by previous methods shows that a far increased increase in the survival was obtained with a combination of 800 kv. external irradiation and intracavitary radium.

Nine photomicrographs are reproduced in the text showing the effect of the radiation on cervical cancer tissues.

T. LEECH, M.D.

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Barker, W H The Uses and Abuses of the Sulfonamide Drugs *Med Clin North Am*, 1947, 25 453

The important work of Domagk reported less than six years ago marks the starting-point of the synthesis and clinical application of the sulfonamide group of drugs. Among the important compounds developed since the introduction of the red dye protosil are sulfanilamide, neoprotosil, sulfapyridine, sulfathiazole, and most recently, sulfanilylguanidine.

Sulfanilamide is still the drug of choice for the treatment of infections due to the beta hemolytic streptococcus, meningococcus, Ducrey bacillus, and Welch bacillus. Its value is also well established in certain infections of the urinary tract, and in trachoma and lymphogranuloma inguinale.

Familiarity with facts regarding the absorption and excretion of the drug is necessary for effective administration. Experimental and clinical observations by Long, Marshall, *et al*, have demonstrated that the peak blood level of sulfanilamide is reached in four hours after the first single dose. They contend, therefore, that the drug should be given in divided doses at four-hour intervals both day and night in order to maintain the desired blood concentration.

In severe infections, a large initial dose of sulfanilamide is recommended in order that the desired level of 10 mgm per cent may be attained as quickly as possible. Recurrences of infection will be rare if sulfanilamide is not discontinued at once, but decreased slowly day by day until the patient has definitely recovered from the infection. In milder tissue infections, blood levels of sulfanilamide of from 5 to 10 mgm per cent are generally adequate.

Sulfanilamide can be given parenterally if the patient cannot tolerate the tablets by mouth or has faulty gastro-intestinal absorption. It is, however, a less satisfactory method of administering the drug and the oral method should be instituted as soon as possible.

It was found that the amount of sulfanilamide per pound of body weight required to establish adequate levels of the drug in the blood of children is considerably greater than that needed in adults. This variation depends on the fluid intake to weight ratio, which is greater in children, especially when fever is present. Experience shows that if large amounts of fluid are given, it is difficult to obtain and maintain effective levels because of the rapid excretion of the sulfanilamide.

Sulfanilamide passes over into the spinal fluid in about the same concentration as in the blood level. Intrathecal therapy is not necessarily indicated in

meningeal infections. Sulfanilamide can be found in a similar concentration in transudates and exudates into all of the body cavities, and collections of pus in closed and open cavities. Since recurrences depend on the too early discontinuance of the drug its administration should be continued for at least ten days after the patient is completely well.

The administration of other drugs during sulfanilamide therapy is not contraindicated, if necessary. Bicarbonate of soda should always be given in doses half as large as or equal to the doses of sulfanilamide, in order to prevent clinical acidosis from developing.

The antidote for sulfanilamide is water given in large amounts rapidly. The toxic manifestations requiring immediate elimination of the drug from the body are granulocytopenia, acute hemolytic anemia, and hepatitis. It is important to follow the temperature, the hemoglobin level, and the leucocyte count at regular and frequent intervals, in order to recognize the more serious toxic effects in their incipency.

Sulfapyridine and sulfathiazole have been found to be distinctly superior to sulfanilamide in the treatment of pneumococcal, staphylococcal, and gonococcal infections.

As with sulfanilamide, it is necessary to be familiar with certain special properties of sulfapyridine and sulfathiazole. Unfortunately, sulfapyridine is much less soluble than sulfanilamide and its absorption may vary from 30 to 80 per cent of the administered dose in two different patients. Conjugation of sulfapyridine in the body to the inactive acetylated form is highly variable in different subjects, so that it is important to determine the level of free sulfapyridine in the blood at frequent intervals. Blood levels of from 4 to 6 mgm per cent of free sulfapyridine are considered satisfactory for the control of mild to moderately severe pneumococcal infections, whereas about double this level is desirable in more serious infections. It has been found expedient to grind the tablets of sulfapyridine and mix the powder in liquids, applesauce, or jam for children.

A soluble sodium salt of sulfapyridine may be given intravenously in pneumococcal bacteremia.

During the administration of these drugs, fluids should be forced sufficiently to maintain the twenty-four-hour output of urine between 1,000 and 1,500 cc in an adult patient. This measure helps to prevent the precipitation in the kidneys of crystals of the acetylated form. There is no need to give sodium bicarbonate with these drugs. Other necessary drugs may be administered in conjunction with sulfapyridine or sulfathiazole.

In pneumococcal pneumonia, each drug appears equally efficient. There is a lower incidence of vomiting with sulfathiazole. Before the administration of either drug, the sputum should be obtained for culture and pneumococcus typing, and a blood

culture should be taken. The drug chosen should be administered to all patients with acute lobar pneumonia, bronchopneumonia, or postoperative pneumonia as soon as the clinical diagnosis is established. In severe purulent bronchitis of pneumococcal origin these drugs are indicated.

A large initial dose of 4 gm. of the drug is advisable for adult patients in order to establish an effective blood level of the drug as soon as possible. Dose of 1 gm. should be given every four hours day and night thereafter until the temperature has remained normal for seventy-two hours. The drug may be discontinued then entirely. In children Long recommends 1 gr. per lb. of body weight as an initial dose and 4 gr. per lb. every six hours as a maintenance dose. This dosage is slightly smaller in infants.

The same general toxic effects with the additional hazard of severe renal damage may occur with sulfapyridine and sulfathiazole as with sulfanilamide. The antidote is the same, the forcing of fluids and discontinuing the drug. The supervision of the patient should include careful clinical observations, the temperature, hemoglobin, leucocyte count, urinalysis, and non-protein nitrogen determinations if the urinary output diminishes.

Since recovery in pneumonia depends on specific antibody formation, type-specific serum should be given to the seriously ill patient especially if he fails to show clinical improvement within forty-eight hours after the institution of chemotherapy.

At present a new sulfonamide drug, sulfathiazole, may prove effective in treating infections of the intestinal tract.

Neopronto breaks down to release sulfanilamide in the body. Its only advantage appears to be its convenience for parenteral administration.

Among the infectious diseases in which sulfonamide therapy seems questionable are many bacillary infections such as undulant fever, tularemia, infections with the Friedländer bacillus or bacillus in fluens; also subacute bacterial endocarditis due to the streptococcus viridans and fungus infections such as actinomycosis.

There are a few conditions in which successful prophylaxis with sulfonamide drugs may be given such as inactive rheumatic heart disease before and after dental extractions and during scarlet fever and other hemolytic streptococcal epidemics. The immediate administration of sulfanilamide to victims of serious crushing injuries such as compound fractures may prevent the development of dangerous secondary infection, particularly with the hemolytic streptococcus or the Welch bacillus. The administration of sulfathiazole before and after resection of a portion of the bowel may help to cut down the danger of postoperative peritonitis.

The use of sulfonamide drugs in infections in which there is no experimental or clinical evidence that such therapy will be of value must be regarded as an abuse of the drug in question. Probably the most widespread abuse of the sulfonamide drugs to date

has occurred by the administration to victims of the filterable viruses, particularly those of the common cold or influenza. The only exceptions apply to lymphogranuloma inguinale. There is no excuse for using these drugs in uncomplicated measles, mumps, chickenpox, poliomyelitis or encephalitis. It appears that sulfanilamide is harmful in active rheumatic fever. It has no effect on uncomplicated tuberculosis, syphilis, enteric fevers or dysentery.

I conclude sulfonamide drugs should not be employed indiscriminately. It is important to select the most effective drug for the treatment of a given infection. These drugs should be administered only under the direct supervision of a physician because of their toxicity and patients receiving any of them should whenever possible be hospitalized in order to insure careful clinical and laboratory control.

JOHN E. KIRKPATRICK, M.D.

Strauss, E. Lowell, F. C. Taylor, F. H. L. and Finland, M. Observations on the Absorption, Excretion, and Distribution of Sulfanilamide, Sulfapyridine, Sulfathiazole, and Sulfamethylthiazole. *Ann. Int. Med.* 1941, 14, 1360.

This article deals with a continuation of studies that have been reported. Human subjects were given by various routes a single 5 gm. dose of sulfanilamide, sulfapyridine, sulfathiazole, and sulfamethylthiazole, and the sodium salts of the latter three drugs. In general, the sodium salts given intravenously or orally yielded higher blood levels, and these levels were attained more rapidly than when the corresponding drugs were given by mouth. The highest level were obtained with sodium sulfathiazole.

Sulfathiazole and its sodium salt were excreted more rapidly into the urine than either sulfanilamide or sulfapyridine. All the drugs, with the exception of sulfamethylthiazole, were excreted more or less quantitatively after intravenous or subcutaneous injection, and almost all of the administered drugs were recovered from the urine after their oral administration. As regards sulfamethylthiazole, only about 60 per cent of the amount administered was recovered from the urine regardless of the route by which it was given. Sulfathiazole showed the least amount of conjugation and sulfapyridine showed the most. After oral administration of sodium sulfapyridine, the percentage of acetylated drug in the blood and urine was considerably lower than that found after sulfapyridine itself was given by mouth.

Different subjects varied with respect to their absorption and conjugation of the different drugs. There were apparently fewer variations with sulfathiazole than with any of the other compounds. Sulfanilamide was fairly well absorbed from the rectum, but all the other drugs were poorly absorbed after rectal administration.

The four compounds were found to distribute themselves differently between the blood plasma and the red blood cells. Sulfanilamide was found in the red blood cells in greater concentration than in the

plasma, sulfapyridine was about equally distributed, sulfathiazole was present in somewhat greater concentrations in the plasma, and sulfamethylthiazole was found mostly in the plasma. Sulfathiazole was cleared from the blood at a rate which was lower than that of either sulfanilamide or sulfapyridine. The clearance rates of these drugs indicated varying degrees of tubular reabsorption which was greatest for sulfamethylthiazole and least for sulfathiazole.

The concentrations of the drugs were higher in the bile and lower in the spinal fluids than in the blood. Sulfathiazole was present regularly in the spinal fluid in about one-third the concentration found in the blood.

Sulfapyridine and sulfathiazole were found in the kidney in considerably higher concentrations than in the blood and other organs. The concentrations of sulfanilamide were about the same in the various organs studied, including the kidney.

The para-acetyl derivatives of sulfanilamide, sulfapyridine, and sulfathiazole were poorly absorbed after oral administration. Only a small percentage of these drugs was de-acetylated.

WALTER H. NADLER, M.D.

Guarnaschelli-Raggio, A. The Action of Dehydro-tachisterin upon Some Electrolytes and upon the β Glycerophosphatase of the Serum in 1 Case of Idiopathic Tetany (*Azione della deidro tachisterina [A.T. 10 di Holtz] su alcuni elettroliti e sulla glicero fosfatasi del siero in un caso di tetania idiopatica*). *Poliedin*, Rome, 1941, 48 sez. med. 1.

The author attempts to clarify the relations which exist between the new compound, dehydrotachisterin, and the mineral metabolism. The diminution of the quantity of ionized calcium in the blood influences the neuromuscular excitability, calcemia below 7 mgm per cent causes tetany. Very few therapies were efficient in tetany. Holtz found dehydrotachisterin effective and called it A.T. 10. It is a 0.5 per cent oil solution obtained from ergosterin, tachisterin, Vitamin D₂, and toxisterin from the "calcinosis factor."

Clairmont and many others admit the superiority of A.T. 10 compared to parathormone and to transplantation therapy. It has been used in all the complications of tetany. It has a steady action and produces a regular hypocalcemic curve. The right dose must be established for each patient individually. Disturbances are very rarely observed, Holtz supposes them to be due to hypercalcemia. They are transitory, and Vitamin A and follicular hormones are antidotes.

One case was studied and found to be an idiopathic tetany. Five cubic centimeters of dehydrotachisterin were administered. For seven days determinations of the mineral content of the serum were carried out. Eleven days later 8 c cm were given, always per os. The condition of the patient was improved after twenty-four hours. He left the clinic after thirty-one days.

The increase of the potassium/calcium value was due at first to hypopotassemia. The curves after the second administration (8 c cm) had the same form as those obtained by plotting the mineral contents after the first treatment with 5 c cm. After the second treatment the potassium content was less than it was before the treatment (18 mgm per cent instead of 20 mgm per cent). After twenty-four hours the potassium content diminished to 6 mgm per cent and then it started to rise slowly again. The seventh day it reached its normal value and on the ninth day it was above normal.

The glycerophosphatase was low before treatment, it reached a normal value the fourth day, and increased to a maximum value on the sixth day. Calcium increased the fourth day and reached its normal value on the fifth day. A decrease then followed, and on the seventh day a slow increase started again.

The potassium/calcium quotient diminished greatly below the normal value during the first four days and then gradually increased. The magnesium content was influenced very little and the change in the magnesium/calcium quotient was due only to the calcium. The maximum change for the magnesium ranged from 1.78 to 1.22 per cent on the seventh day.

The phosphoremia increased to its maximum on the second day and returned to its initial value on the fifth, with the same values and forms of curves in both treatments (8 c cm and 5 c cm).

The calcium/phosphorus quotient varied only on account of the calcium. The calcium + magnesium/phosphorus quotient was similar to the calcium/phosphorus quotient. The potassium + phosphorus/calcium + magnesium quotient was similar to the potassium/calcium quotient.

It seems that dehydrotachisterin acts especially upon the potassium and the calcium, influences the sympathetic nervous system, and regulates the mineral metabolism.

NELDA CASSUTO

Ramos, J., and Orta, J. Symptomatology and Histopathology of the Heart in Patients with Mega-Esophagus and Megacolon (*Clinica e histopatologia do coração em portadores de mega-esôfago e megacolo*). *Arq de cirurg clin e exper*, 1940, 4, 363.

The authors state that, although mega-esophagus and megacolon may be found to appear separately in some patients, they may be associated in others, because of this association, which is not at all rare, it is believed that these two morbid conditions must have a common etiopathogenesis. The disturbances in the passage of substances through the digestive tract are due to an achalasia of the sphincter or sphincters where the disease is localized. These functional disturbances are a consequence of intense and extensive lesions of the myo-enteric plexuses as has been demonstrated by previous histological studies. The etiological element which is capable of causing these lesions is still unknown. Because of the frequent presence of similar lesions in other meta-

sympathetic groups lesions which recall deficiency diseases some authors want to include the diseases qualified with the prefix mega in the huge group of the incomplete avitaminoses

The histological lesions characteristic of mega esophagus and megacolon localized in the intramural sympathetic plexuses of the esophagus stomach colon and rectum have already been studied in previous works. In the present work similar researches in the domain of the cardiac metasympathetic are reported. This study not only showed that the mega syndromes have to be considered as a general disease the anatomical basis of which would be a neuropathy of the vegetative nervous system but also confirmed that abnormalities in the electrocardiogram are very frequent in patients with mega-esophagus and megacolon.

The material of the present study consists of 73 cases including 51 of mega esophagus 12 of megacolon and 10 of association of the two syndromes. In all of these cases detailed clinical observations especially concerning the functional and physical disturbances of the heart and roentgen examinations were made. Electrocardiograms were obtained in 62 cases. In addition to several autopsies made previously the present work gives the details of the histological examinations of 6 cases which were made to study the condition of the autonomous nervous system of the heart.

Various interesting observations were made the most important of which are the following:

1. It was found that the abnormalities of the electrocardiogram in the bearers of the group mega syndromes are really frequent. Generally speaking they can be divided into two groups: (a) alterations of slight or of no pathological significance: different and isolated alterations of the P wave (15 cases) absence of the T wave in lead III (6 cases) increase in amplitude of T in one or two leads (3 cases) increase in amplitude of T in three leads (1 case) decrease in amplitude of T in one or two leads (7 cases) diphasia of the T wave isolated in lead III (8 cases) negative T wave in lead III (13 cases) extrasystolia demonstrable in the graphic record (4 cases) and paroxysmic tachycardia (1 case) and (b) alterations with pathological significance: increase in the P-R space (1 case) increase in amplitude of Q3

wave (1 case) increased duration of the initial ventricular complex (17 cases) presence of anomalous incursions in the QRS complex (5 cases) alterations in the amplitude of initial ventricular complex accidents increase being observed in 6 cases and decrease in 21 cases disturbances of the intraventricular conduction (8 cases) deviation of the electric axis to the left in 2 cases and to the right in 13 cases slight alterations in the intermedary RS-T segment (4 cases) absence of the T wave in the three leads (3 cases) pronounced decrease in the amplitude of T in the three leads (8 cases) diphasia of the isolated T wave in leads I and II (5 cases) and negative T wave in the three leads or in lead I (2 cases).

The frequency of the abnormalities in the electrocardiogram demonstrates the existence of more or less important disturbances of the heart. These disturbances seem to indicate that the heart really is attacked in the diseases and not only deviated or compressed (mega esophagus) as was believed of old.

2. In the immense majority of the cases the physical examination as well as the roentgenological data and especially the subjective phenomena (good capacity for work except during the crises) rarely revealed the presence of any cardiac disturbances which would indicate the existence of the organ's insufficiency. It is interesting to stress this divergence between marked abnormalities in the electrocardiogram and the good condition of the heart. Sometimes even the cardiac discomfort present during the achalasia crises disappeared completely after cure of the process or after cessation of the crises even though in some of these cases the electrocardiogram was quite anomalous.

3. The histological study of the heart of 6 patients shows differences of the chronic type in the intramural sympathetic plexus very similar to the degenerative processes previously observed in the intramural sympathetic plexuses of the esophagus stomach colon and rectum. The basic picture found is the terminal process of an irreparable destruction of the atrial and ventricular subepicardic and endocardic plexuses with total fibrosis of the ganglionic groups. The interstitial myocarditis eventually observed is very discreet and seems to be secondary to the destruction of the plexuses. RICHARD KEMEL, M.D.

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PRINCIPLES OF SURGICAL PRACTICE

ABDOMINAL TRAUMAS

Panel Discussion

FREDERIC A. BESLEY, M.D., F.A.C.S., Waukegan, Illinois—Presiding

Collaborators JOHN H. MULHOLLAND, M.D., F.A.C.S., New York, New York, FRED W. BAILEY, M.D., F.A.C.S., St. Louis, Missouri, AMBROSE H. STORCK, M.D., F.A.C.S., New Orleans, Louisiana

INTRODUCTION

ANY discussion of this subject, abdominal traumas, involves a consideration of many pathological conditions and clinical signs as they concern the various solid and hollow viscera within the abdominal cavity. In these panel discussions it would seem desirable to elicit as comprehensive a general discussion from the audience as possible. Therefore, the presentations of your leaders will be short and informal.

It would seem wise, because of the numerous organs that may be involved in this broad problem, to consider the subject of abdominal traumas as an entity. There are some phases in the diagnosis and treatment of conditions arising from trauma to the abdomen that are more or less standardized and generally accepted. It may serve a greater purpose to confine a good deal of our thought to the questions that are controversial and less understood regarding the pathology, diagnosis, and treatment of the entity.

Abdominal traumas come under two general heads—the penetrating direct injuries, and the non-penetrating or indirect injuries. The penetrating wounds are due in a vast majority of cases to gunshot wounds and stab wounds. The evolution of the automobile and the ever-increasing number and speed of cars has resulted in all of our seeing more non-penetrating injuries to the ab-

domen. The mechanism of injuries to abdominal organs from penetrating wounds is easily understood. The larger number of extensive non-penetrating injuries to the hollow and solid viscera are probably caused by a crushing force which results in an impingement of the organ against the spine. Increased abdominal pressure is a factor in producing a bursting force. The distended organ is more susceptible to rupture.

When the patient is first seen following a serious abdominal trauma there is usually severe shock with all of the usual manifestations. Haste in applying surgical therapy should never be employed. The first procedure should be the giving of morphia and atropine. Frequent blood-pressure readings are all important and operative procedures should be delayed until the pressure is above 90, unless there are extenuating circumstances which demand immediate surgical therapy. The intravenous administration of large quantities of salt solution should be avoided until hemorrhage is controlled. The reasons are obvious. The practice of rushing a patient to the X-ray Department should be discouraged. Reasonable roentgenological examinations should always be employed in searching for evidence of free gas in the peritoneal cavity. Since there is serious shock in practically all severe abdominal injuries it follows that our present knowledge of blood transfusion prompts us to use it at once. From 300 to 500 c.c. should be given, and more as soon as the hemorrhage has been controlled.

Panel Discussion, Clinical Congress of the American College of Surgeons, Chicago, Illinois, October 21, 1940

The question of a progressive hemorrhage is the all important one to be solved in determining the advisability of an immediate operation. We are all familiar with the changing blood picture and the relative information frequent blood examinations give us. A more recent method of estimating the amount of blood that is being lost by continuing hemorrhage is by means of the relative specific gravity of the blood as it is recorded at frequent intervals. This test has been made more simple and Dr. Bailey and Dr. Scudder have presented some excellent observations in this particular. The question of when and if to operate in these serious abdominal traumas places a grave responsibility on the surgeon. In any assessment of the clinical findings in a given case the experience and surgical judgment of the surgeon are paramount in determining the safety and indication for an operation. All penetrating traumas should be operated on as soon as possible. The question of operation in non-penetrating traumas demands careful consideration. The kind and position of the incision employed may be indicated by the position and direction of the wound when present. If there is a wound of entrance and exit they may be helpful in indicating the organs that may be injured.

Upon opening the abdomen in case of gunshot wounds a systematic search for penetration of the viscera should be made. This may be modified if the wound of entrance and exit indicates that the upper or lower abdominal organs have probably escaped.

If there are several wounds of entrance or external wounds which would seem to show that the missile had traveled the cavity in a longitudinal direction it is expedient to begin a search in the upper abdomen and expose both surfaces of the stomach, examine the pancreas, liver and spleen and then quickly run the intestinal tract from the duodenum to the rectum.

If a penetrating wound of the ascending or descending colon is found which penetrates its posterior attachment and one is working through a longitudinal incision it is good practice to quickly make a transverse cut and expose the retroperitoneal space and later drain this area. The kind of suture material used in closing the perforations will depend on the preference of the operator.

A special word may be said of an injury to the pancreas which may be slight and produce a so-called pseudopancreatic cyst, a collection of fluid in the lesser peritoneal cavity. This will manifest itself later.

Drainage of the peritoneal cavity after repair of the damage is not satisfactory and should not be employed unless packing for hemorrhage or for drainage of a penetration into the retroperitoneal space has been done or when the urinary bladder is involved. The after treatment is that employed in any serious abdominal operation and may require blood transfusions and maintenance of the water balance. The value of the Wangenstein tube in the after treatment in such cases is well recognized.

CAUSE OF THE MORTALITY

JOHN H. MULHOLLAND, M.D., F.A.C.S., New York, New York

A DISCUSSION of the general subject of abdominal traumas involves such an extensive consideration of its many aspects that one individual can with profit approach but one phase. Because each case is an individual problem, guiding principles applicable to all cases must be based on the broadest surgical experience. The importance of the subject is of course attested by the generally reported high mortality figures. An attempt to reduce the mortality by any means available is the direct approach and almost all advance in surgery will find use in abdominal injuries. A review of 70 cases was made with this in mind. All were

from the Third (New York University) Division of Bellevue Hospital and all were abdominal traumas of the penetrating type. The patients were admitted prior to early 1939 when newer methods of diagnosis and care were instituted.

The mortality in this series was 36 cases or 51 per cent. of which 30 were examined at autopsy. The records of these 30 patients were used for the review which is the basis of this discussion. The records in many cases were not specific enough to attribute death to any one cause. Contributory findings or combinations of the three leading mortality factors—*infection, shock, and hemorrhage*—were the rule. When one made an attempt to decide which of these three conditions was most prominent and to state one primary cause of

death on the assumption that if this factor were controlled the death might not have occurred, some interesting findings resulted

In some cases, infection was obviously the cause of death, no hemorrhage and no record of shock being found. These patients all died after operation and an elapse of time which was greater than the shock and hemorrhage period. Autopsy, as a rule, revealed generalized peritonitis. In other cases, hemorrhage was obviously the cause of death. Large collections of blood in the peritoneum, retroperitoneal tissues, or even in the chest in patients who succumbed shortly after injury, were the common findings. In a few there was neither hemorrhage which could be considered sufficient in itself to produce death, nor infection. These cases were designated as fatalities due to shock. Hemorrhage and shock combined are so mutually enhancing and fatal that division of responsibility is always difficult. The degree of shock and the mortality rate is in direct proportion to the amount of hemorrhage. Nevertheless, an attempt was made to designate a single condition. On this basis, with one cause only selected as the lethal one or the most important, the cases may be divided as follows:

13 patients or 43 per cent died of infection

13 patients or 43 per cent died of shock (?)

4 patients or 14 per cent died of hemorrhage

An analysis of all the cases was made with the following questions in mind. Could any have been saved? Are there any new concepts which, applied to these patients, would have aided in the diagnosis, preparation, or treatment? Could these methods be carried out speedily, easily, and by the average surgeon? It would appear that all these questions may be answered in the affirmative.

There were 4 cases with profuse hemorrhage. Two of these were not operated upon because of the poor condition of the patients on admission. One was a stab wound with laceration of the mesentery and bleeding from the mesenteric vessels. This patient lived for three hours and did not respond to measures designed to combat shock. The other non-operated case was that of a patient with a stab wound of the lower abdomen who was admitted in poor condition, he did not respond to the ordinary shock measures and died in forty-eight hours. There were no signs indicating peritoneal irritation. At autopsy a laceration of the external iliac artery with an enormous retroperitoneal hemorrhage was found. One patient was operated upon late, a lacerated spleen was removed, but the patient died. The fourth patient was diagnosed as having a severe

hemorrhage, he was operated upon and the bleeding point secured, but he died shortly.

It is conceivable that with different management in the first 3 patients they may have survived. Non-recognition of the fact that hemorrhage was the cause of collapse and that no measure short of controlling the hemorrhage would be of avail resulted in delay.

There were 13 cases in which shock was the principal factor producing death. In many of the patients, multiple injuries of the chest or head were present, which complicated the abdominal trauma. Among this group, however, there were 4 patients who died following early, adequate operation within a short period after operation and with no signs of infection. Two of these patients were diagnosed as having hemorrhage before operation. It seemed that shock was not adequately treated before operation in the other 2 cases.

There were 13 cases of infection. Two had visceral lesions which were missed at operation and discovered at autopsy. Among the remainder, it was difficult to determine whether technical mistakes, e.g., leaking anastomosis, or the initial spilling, was the prime cause of infection. It is reasonable to assume that some infected cases, at least, were due to the initial trauma and, if a method for combating the infection had been at hand, they might have been saved.

If 3 cases of hemorrhage, 2 of shock and 2 of infection had been saved our mortality would have been reduced by 10 per cent—from 51 to 41 per cent. It is not unreasonable to expect such a reduction with the newer methods available for diagnosis, preparation, and treatment of these patients. As has been pointed out by Dr. Bailey in this panel and in his writings, we have methods for the differentiation of shock and hemorrhage which are simple and easy to carry out. A repeated determination of the specific gravity of the blood by the falling-drop method is a sensitive and accurate measure of blood loss or blood concentration. Confirmatory hematocrit or plasma-protein determinations are helpful, but a curve of changing specific gravity is the most delicate index of the condition of the patient under the circumstances. If the diagnosis of lacerated external iliac artery had been made early in its course—and specific-gravity determinations every half hour could have established the fact within three hours—a relatively simple ligation would certainly have saved the patient. He survived for forty-eight hours on supportive treatment. In the case of the lacerated spleen, the knowledge of intermittent severe bleeding, which probably

of saline and glucose solutions. Studies of the specific gravity of the blood by means of the falling drop method and the determination of the mean corpuscular volume as discussed by the collaborators who have preceded me in this panel discussion are valuable therapeutic guides in the management both of cases which when first seen definitely manifest shock and hemorrhage as well as in cases in which the presence or progress of shock and hemorrhage is doubtful. It is now appreciated that the 500 or 1000 ccm transfusions which formerly were considered adequate are actually ineffectual and that much larger amounts i.e. 2000 or 3000 ccm are often necessary. There are evidences that adrenocortical extract is of value in the treatment of shock, and there have also been observations which suggest that the administration of blood plasma along with pituitary extract is more effective than the administration of plasma alone. Oxygen therapy is of proved value in relieving anoxia associated with shock whether or not due to hemorrhage and several types of apparatus are now available which facilitate the easy administration of this gas. Potent preparations of thrombin have been produced which should prove valuable for topical application to bleeding surfaces such as exist following lacerating liver wounds.

Peritonitis and ileus. Some degree of these conditions is inevitably associated with most penetrating wounds of the abdomen and ileus may also follow non-penetrating wounds of the abdomen. The administration of morphine in doses sufficiently large to maintain intestinal tone, the application of heat to the abdomen and the avoidance of distention of the gastro-intestinal tract by the employment of suction drainage and oxygen therapy are measures of proved value for both the prevention and treatment of peritonitis and ileus. Administration of adrenocortical hormone is a rational means of combating the adrenocortical deficiency associated with peritonitis. Maintenance of the blood plasma proteins at normal levels by means of transfusions of whole blood or blood elements is effective not only for maintaining liver function and resistance to infection but for assuring the presence in adequate amounts of those elements which are important in the healing of wounds including wounds in the hollow viscera. The need for and the method of maintaining water balance and furnishing mineral requirements in cases with peritonitis require no further comment. There is evidence which suggests the efficacy of sulfonamide drugs placed directly into the peritoneal cavity as a means of preventing or reducing the severity of peritonitis. The administra-

tion of appropriate amounts of vitamins especially Vitamins B and C has a definite place in the total treatment of peritonitis. Experimental work is at present under way in the Department of Surgery at Tulane University which it is hoped will demonstrate the feasibility of reducing the severity of peritonitis in military casualty cases. This investigation concerns the transformation of the intestinal flora of troops on active duty who are likely to sustain abdominal perforating wounds by the administration of cultures of lactobacilli.

Wound infection. This is to be anticipated in most cases of abdominal injury either from external sources or from the perforation of hollow viscera. In addition to the administration of appropriate antisera such as tetanus and mixed anti-anaerobic sera, adequate debridement of the wound, the use of non-absorbable suture material such as silk cotton or wire, the instillation of sulfonamide drugs into the wound, the administration of large doses of Vitamin C, the maintenance of plasma protein at levels which permit sound wound healing and the application of pressure dressings are among the measures which reduce the frequency of serious postoperative wound infection and wound disruption. Drainage of the wound by means of rubber tissue will usually prevent the development of an intramural abscess which could subsequently rupture into the peritoneal cavity. When wound infection develops despite the measures which have been enumerated, adequate drainage of the wound followed by the application of zinc peroxide paste dressings may be employed especially in those cases in which there is infection with micro-aerophilic hemolytic streptococci or other anaerobic organisms.

Pulmonary complications. Atelectasis and pneumonia are frequent complications of abdominal wounds. Associated chest injury, shallow respiration due to pain, limited excursion of the diaphragm due to abdominal distention and tight abdominal dressings are among the causes of these complications. The administration of morphine in amounts sufficient to relieve pain but not to unduly depress respiration, frequent changing of the patient's position, deep breathing exercises beginning immediately following operation, avoidance of too-tight abdominal dressings and aspiration of secretions from the pharynx and trachea following anesthesia are measures which reduce the incidence of pulmonary complications. When atelectasis occurs, bronchoscopic aspiration usually should be done. Modern method of treating pneumonia with sulfonamide drugs and serum have improved the prognosis in cases in which this complication develops.

Associated injuries Injuries to other parts of the body are responsible for the death of many abdominal casualty cases. Spinal-cord injuries, head injuries, neck injuries, and serious injuries to the extremities, in addition to abdominothoracic wounds, often determine a fatal outcome in individuals who would have survived the abdominal injury.

Overlooked or unrecognized abdominal injuries Failure to promptly recognize the fact that serious abdominal injury has occurred is responsible for a considerable number of deaths. Although failure to realize that serious visceral injury has occurred is most frequent in the instance of non-penetrating subparietal injuries, failure to consider the possibility of intraperitoneal penetration is not uncommon in the instance of missiles which enter through the hip, gluteal region, perineum, or sacral region.

The symptoms and physical findings associated with intra-abdominal injury are sometimes remarkably ill-defined. Pain may be absent, and even when present may be of such a degree or distribution that it is of little or no value in indicating the location or extent of the injury. Nausea and vomiting may not occur, even when the stomach has been penetrated. Tenderness and rigidity may be either so slight or so indefinitely localized as to be of little or no value in diagnosis. Careful observation of the character of respiration is essential, because in the presence of intra-abdominal injury, there is usually an absence of an abdominal element in respiration. Significant changes in the pulse rate and blood pressure frequently do not occur until extensive hemorrhage has occurred, or until shock is impending or established. The determination of changes in the specific gravity and mean corpuscular volume of the blood is a more dependable method for detecting shock and concealed hemorrhage than is observation of the pulse rate and blood pressure. The newer method should be employed especially in the study and observation of cases in which intra-abdominal injury is suspected, although not definitely known to be present. Red blood-cell counts often do not change significantly until serious hemorrhage has occurred. Study of the entrance and exit wounds, or x-ray localization of a missile which has been retained, usually indicates whether or not there has been intra-abdominal penetration. Peritrecscopy may be employed under some circumstances, especially for the purpose of revealing penetration of the peritoneum but this method is not dependable for determining the presence or extent of visceral injury. When considering the possible entry of a missile into the abdominal cavity, it is helpful to

know the position or physical attitude of the patient at the time the injury was incurred. Injuries to the kidneys and urinary tract, although often not productive of distinctive symptoms, will usually be revealed if either gross or microscopic examination of the urine is made in all cases in which there is any possibility of their injury.

In addition to complete failure to consider the possibility of abdominal injury, one or more visceral injuries are often overlooked even during operation. Perforations of the posterior wall of the stomach and those near the junction of the mesentery with the intestines, as well as perforations involving the rectum or located in the region of the splenic and hepatic flexures of the colon, may easily be overlooked unless the possibility of injuries in these locations is kept in mind.

Anesthesia The choice of anesthesia may be influenced by the presence of associated thoracic, neck, head, or spine injuries. Gas anesthesia does not, as a rule, permit the degree of abdominal relaxation which facilitates thorough and rapid exploration. Ether, because of its ready availability and the great number of people who can administer it, will, in spite of its undesirable features, continue to be most appropriate in some cases. Spinal anesthesia, although unequivocally condemned by some observers for employment in all cases of gunshot or penetrating wounds of the abdomen, is frequently the anesthetic of choice, and if its use is limited to appropriate cases, it is not only a safe, but a highly desirable form of anesthesia. In 10 of a series of 46 personal cases of penetrating wounds of the abdomen, spinal anesthesia was administered, and in none of these was there a fatal outcome. Local anesthesia is usually inadequate, especially in cases with extensive abdominal trauma, although it may be advantageously used at times to supplement inhalation anesthesia.

Prolonged, unnecessary, or undesirable operative procedures The necessity of expeditiously performing the minimal amount of exploration, and of limiting any operative procedures to the simplest forms which will be adequate is in no type of case more important than in the instance of the patient who has suffered a severe abdominal trauma. Repeated handling and reinspection of the intestine prolongs the operation and the anesthetic, and increases the amount of shock associated with the operative procedure. Enterostomy, which was formerly considered appropriate in many cases, should seldom, if ever, be employed. Resection of segments of intestine should be avoided whenever possible, as the individual repair of even multiple closely situated perforations causes less shock than is produced by the resection of even a small

segment of bowel When resection of a segment of intestine is imperative mechanical anastomosis devices should not be used for re-establishing the continuity of the gut

Lavage of the peritoneal cavity in order to wash out foreign bodies is not only ineffectual and almost certain to cause dissemination of infectious material but it is also undesirable because of the exposure, chilling and loss of body heat which it entails. It is better to suck out, pick out or sponge out blood, blood clots, pieces of clothing, pieces of wadding, feces or other foreign bodies rather than to attempt to remove them by lavage. Effective drainage of the peritoneal cavity is not only impossible but the introduction of drains is likely to lead to secondary intestinal obstruction or to the formation of intestinal fistulas.

Residual abscesses Undrained residual abscesses in the subphrenic space, the cul de sac of Douglas, the iliac fossae, between loops of intestine or in other areas of the abdomen may be responsible for a fatal outcome if overlooked. The likelihood of the development of such abscesses must be kept in mind and frequent examinations made to detect them by physical means or by the aid of x-ray examination.

Reports concerning the high mortality associated with abdominal injuries in the present war in Europe indicate that many of the injuries are of such an extensive and multiple nature that many

are either immediately fatal or make eventual recovery impossible. The speed of modern warfare so complicates and interferes with the collection and transportation of abdominal casualty cases that it is now more than ever important to consider the possible preliminary precautions which may be taken to reduce the incidence of the wounds or to minimize their seriousness. Motorized mobile hospital units and transportation of abdominal casualty cases by means of airplanes can to a limited degree relieve the present situation. At a meeting of the Section of Surgery of the Royal Academy of Medicine of England in June, 1940, it was stated that at the time the English forces left France there were probably 2,000 casualty cases in base hospital in France of which only about a dozen had chest or abdominal wound, thus evidencing the early high mortality in such cases. This experience indicates the need for the adoption of some type of protective body armor such as was employed during the recent successful invasion of Belgium. The recent demonstration of the effectiveness of sulfanilylguanidine administered orally in greatly reducing the number of coliform bacteria in the intestinal tract suggests that the preparation of troops who are to go into action by means of appropriate administration of this drug may result in reduction of the virulence of peritonitis caused by penetrating abdominal injuries.

ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

EYE

Kirby, D B. Injuries of the Eyes. *Surge Clin North Am*, 1941, 21: 331

Kirby takes up the various types of ocular injuries systematically and illustrates many of them well. He gives the complications to be expected, the treatment, and prognosis. The latter part of the paper is devoted to medicolegal problems encountered, the basic factors used in the various states for computing visual disability, and the duties of the physician in testifying at law suits.

A copy of this paper should be a ready reference for eye physicians. **LESLIE L. MCCOY, M D**

Caveness, H L., Satterfield, G H., and Dann, W J. Correlation of the Results of the Biophotometer Test with the Vitamin A Content of Human Blood. *Arch Ophthalmol*, 1941, 25: 827

In 71 subjects the authors determined the Vitamin A and carotene content of the blood by the method of Max with the Evelyn photo-electric microcolorimeter, calculated the total A biological activity of the plasma in USP units, and made biophotometer tests according to Jeans. On the assumption that night blindness is due to Vitamin A deficiency, it might be expected that a single datum for expressing the degree of night blindness would be correlated fairly closely with the Vitamin A content of the blood. However, as a result of their statistical analysis the authors conclude that it would be impossible to make a useful prediction of the Vitamin A content of the blood from the light adapted or dark adapted visual thresholds measured by the biophotometer or vice versa. Hence, they deduce that the biophotometer is unlikely to prove a suitable instrument for measuring with any precision the degree of Vitamin A undernutrition of the human subject.

In their second article 2 healthy subjects were put on a Vitamin A deficient diet for five weeks. No significant change occurred in the Vitamin A level in the plasma and no change in dark adaptation occurred. This seems to indicate that no deficiency occurred during the period of observation even though the diet was selected to be very low in Vitamin A. They conclude that the whole question of normal Vitamin A nutrition needs re-examination.

PAUL STARR, M D

Kravitz, D., and Moehle, W. Exophthalmos in Hyperthyroidism. *Am J Ophthalmol*, 1941, 24: 527

The authors present a resume of the literature together with the prevailing theories and views regarding exophthalmos in hyperthyroidism. Several

of the case reports are very interesting and instructive. It is concluded that although the exophthalmos in toxic goiter is the result of a general stimulant circulating in the blood, one eye may be involved an appreciable time before the other. This may occur because the sympathetic chain on one side has been sensitized to the toxin earlier.

Of further interest was the early presence of increased intraocular tension, is soon is conjunctival edema presented itself, and the increase of the tension is the edema of the conjunctiva and the exophthalmos increased. With the increase in tension the cornea became steamy. Thus, the picture of an acute glaucoma was present early in the progress of the disease. It seems to the authors that this complication may be the result of edema of the orbital tissues and interference with the venous return from the eye. This, however, does not explain the corneal ulcer which came on simultaneously with the lagophthalmos and before increased tension in the eye was manifest, nor can the ulcer be explained by the lagophthalmos, which was not present long enough to result in a drying of the cornea.

It would therefore appear that in certain cases the circulating toxins have a direct deleterious trophic effect upon the cornea. Later, the increased tension and conjunctival edema further interfere with corneal nutrition, with a resultant spread of the ulcer and ultimate destruction of the cornea.

The early orbital congestion and the conjunctival edema are somewhat difficult to explain. Stimulation of the sympathetic nerves should result in contraction of the arteries, and so prevent, or at least have a beneficial effect on, edema, but the rapid occurrence of edema speaks rather for a vascular paralysis, with a rapid transudation or exudation of fluid. The chronic inflammatory changes found in sections of excised conjunctivas are probably the result of a long standing edema. It may therefore be that one of the circulating toxins has a direct paralyzing effect on the musculature of the blood vessels, or that it acts via the parasympathetic system at the myoneural junction.

In view of the work in endocrinology, the early administration of thyroxine should have been tried.

In addition, x-ray therapy over the pituitary region might be tried. Large doses of phosphorus and calcium to lessen the irritability of the nerves are indicated.

From a survey of the available literature, it would seem that exophthalmos in man is the result of a sympathetic stimulation with a resultant contraction of Mueller's orbital muscle. In addition, there seems to be a vascular paralysis which results in orbital and conjunctival edema. This, together with a direct

trophic effect on the cornea results in the rapid destruction of the latter

Because of the various physiological reactions the underlying anatomical changes in these cases of exophthalmos are different. For this reason no form of therapy including decapitation of the roof of the orbit has thus far been successful in more than a small percentage of cases. Possibly application of the newer ideas in endocrinology may give better results. When other methods are failing they are at least deserving of trial. LESLIE L. MCCOY, M.D.

Verhoeff F H. Occlusion Hypertropia. *Arch Ophth* 1941 25 78

Analyzing 42 cases of what has at various times been termed alternating hyperphoria, double hyperphoria, and alternating hypertropia, the author concludes that the three terms are inexact and suggests that the condition be called occlusus on hypertropia.

By means of numerous tests and on theoretical grounds he states that three conjugate mechanisms can be differentiated: two monocular and one binocular. Occlusion hypertropia may then be considered as due to congenital monocular conjugate insufficiency either unilateral or bilateral. This conjugate insufficiency may concern the superior oblique muscle, the inferior rectus, or both. There are usually associated motor defects, especially esophoria or esotropia. Nystagmus may be present. There is often a congenital hypoplasia of one or both fourth nuclei, which produces the effect of so-called overaction of the inferior oblique muscles.

The presence of occlusion hypertropia should be considered in planning the treatment of cases of strabismus. WILLIAM A. MANN, M.D.

Lijó Pavía J. The Eye and Under Sodium Light Cases of Old Trauma with Loss of Vision in One Eye and Lesions of the Eyeground in the Other (*Fo do d o j la lu d od Traum t mo a t g o co pérda de jo y l i s del f nd el otr*). *Rev t ne o f i smol y de c g* 1 s d me c 1941 16 4

Three cases are described in which an old injury had caused loss of vision in one eye and lesions of the eyeground in the other. The first patient was a man of thirty who had been struck in the left eye with a stone when thirteen years of age. The second was a woman of forty-eight who had suffered an injury of the right eye six years before, which had necessitated the enucleation of the eye five years later. The third was a man of forty, even who at the age of ten or three years had been struck in the right eye with a stone, and did not remember ever having had vision in this eye. The last two patients had signs of syphilis and were given anti-syphilitic treatment. Detailed descriptions of the ophthalmological findings with different forms of light are given and illustrated with stereoretinographic pictures. Sodium light showed perhaps more detail in regard to the condition of the vessels and nerves than ordinary light and in the second case in which ordinary light showed punctate

lesions which could not be definitely localized, sodium light showed that these lesions were localized immediately behind the retina.

AUDREY G. MORGAN, M.D.

EAR

Frey H, Stokes A B and Ewing I R. Discussion on the Psychological Aspects of Deafness. *P s c Roy Soc Med L* 1941 34 399

Frey states that the mental depression of the deafened is open to relief by the application of mental energy and effort seems to him to be the best proof of its neurotic character and origin. Only a few of the deaf can find their way out of their pathologically strained mental condition unaided. This opens a wide vista for the psychic treatment and reduction of these individuals.

Stokes states that the lessening of the burden of deafness by the use of hearing aid, by lip reading and by social readjustments will allow compensations to develop within the personality. An understanding of the kind of person to be dealt with will indicate how the best compensations may be fostered.

Ewing states that the psychological effects of deafness depend upon many other active and reactive factors in addition to deafness itself—the health and age of a patient, his environment and experience, his social attitude and his disposition towards deafities, his intelligence and physical and mental readiness or unreadiness to acquire new habits, the nature of his work, and interests, his resourcefulness and his sense of humor. JAMES C. BRASWELL, M.D.

Lempert J. Endaural Fenestration of the Horizontal Semicircular Canal for Otosclerosis. In *Ear and Ear Postoperative Results*. *Laryng* 1941 51 330

Lempert states that surgery for the improvement of hearing in otosclerosis is no longer in the experimental stage. There is no surgical risk to life involved in the fenestration of the external semicircular canal for the restoration of practical physiological hearing in otosclerosis when this surgical procedure is performed under the strictest rules of asepsis. The amount and nature of the discomfort a patient is subjected to as a result of this surgery compares favorably with any other elective major surgical procedure and is disproportionately small when compared to the physical, mental, social, and economic benefits derived from such surgery when it results in the restoration of practical hearing.

The success of this work of course will always vary with the skill and patience of the operator. Practical physiological hearing can be permanently restored in about 80 per cent of the properly chosen cases of otosclerosis. This operation should be judged by the great percentage of successful permanent results obtained therewith and not by the occasional failures which must of necessity accompany almost

every surgical procedure because of the human variable

This operation should not be regarded as just another operative technique added to the list of operative procedures on the temporal bone. It blasts a trail for a new and different type of surgery on the temporal bone. It is based upon different surgical principles than any surgery heretofore employed for the relief of suppurative lesions in the temporal bone. The best results from this surgical procedure will be obtained by otologists who, in addition to an extensive experience in all surgery upon the temporal bone, are possessed of thorough knowledge of the surgical principles pertaining to plastic reconstructive surgery.

In fairness to the already successful development of the surgery for otosclerosis and for the protection of its future, Lempert believes that no otologist, no matter how skillful a surgeon he may be, should attempt this particular operation without having received special training in this type of surgery under supervision and guidance.

NOAH D. FABRICANT, M.D.

Blashki, E. P., and Clowes, A. L. The Operative Treatment of Mastoiditis. A Report on Work Done at the Royal North Shore Hospital of Sydney during the Period from January, 1930, to September, 1940. *Med J Australia*, 1941, 1, 443.

In this article the authors record all the cases in which mastoid operations were performed at the Royal North Shore Hospital of Sydney, Australia, over a ten-year period. At least 8 of the 23 patients who died were already moribund when treatment was undertaken. Three others were victims of serious complications at the time of their admission to the hospital. Brain abscesses were diagnosed in 9 instances.

As a general rule, the methods adopted in all of the operations were uniform. The authors emphasize their routine method in acute cases of wound closure with drainage by means of a glass tube in the inferior angle. The fatal cases are reported in abstract form.

NOAH D. FABRICANT, M.D.

MOUTH

Finocchiaro, R. Cystic Perithelioma of the Tongue (Perithelioma cistico della lingua). *Polichin*, Rome, 1941, 48 sez. chir. 102.

The term perithelioma is applied to tumors presenting an enormous proliferation of the blood vessels, the essential element of which is the multiplication of the cells surrounding the capillaries, which cells have been designated by Eberth as perithelial cells. The basic histomorphological character of these tumors is an endothelial proliferation which in part imitates the normal development of the vessels; there are strands of endothelial cells which are solid at first and become canalized secondarily. This proliferation occurs in a more or less abundant, fibrous,

mucoid, and at times chondroid stroma and the tubular formations filled with blood or lymph differ from normal capillaries by their more copious and disordered endothelial proliferation. Practically, however, the absence of characteristics which can be applied to all cases often makes it difficult to discover the origin of the neoplastic elements, and the difficulties increase when the tumoral tissue assumes a massive form without hematic or lymphatic indications for differentiation, or when progressive or sudden changes occur in the primary structure of the tumor with the appearance of more immature and undifferentiated elements.

Finocchiaro describes a case of angioblastoma of the left side of the tongue, the size of a pigeon's egg. The removed tumor consisted of an oval cystic formation having a thick fibrous capsule, part of the cavity was occupied by small, soft, pink, knobby masses and the same tissue spread from the principal mass to make a thinner lining for most of the remaining part of the cavity. Histological examination of the mass showed an enormous proliferation of packed cells with here and there some small blood and lymph vessels and irregular lacunae. There was no stroma. More intensely stained strands of cells, running perpendicularly to the vessels and resembling solid vascular buds, stood out on the uniform background of the cell mass, some of these strands showed a beginning of central canalization. The blood and lymph vessels, the lumen of which was lined with typical, normal endothelium, were covered externally by a thick layer of cells decreasing gradually toward the periphery. These cells had a uniform aspect with round or oval nucleus and were more intensely stained close to the vessels, they seemed to proliferate directly at the periphery of the capillaries in perfect continuity with the endothelium from which they were differentiated by the greater homogeneity of their protoplasm, by their nearly constantly round nucleus, and by the gradual decrease of their color toward the periphery.

The peculiar structure of the tumor with its typical elements allowed eliminating mucoid cyst, ranula, and cavernous or cystic lymphangioma, and recognizing the characteristics of endothelioma. The tumor was evidently benign. Its cystic evolution and the presence of a serosanguineous fluid in its cavity were probably due to progressive disintegration of the peripheral parts of the tumor and consequent slow oozing of blood and lymph in the cavity. It was difficult to decide between hematic and lymphatic origin of the tumor, as both elements were present, it is probable that the neoplastic stimulus was exercised simultaneously on all the endothelial elements of the region, and produced a mixed form. The tumor must be included in the group of peritheliomas because the neoplastic proliferation was observed exclusively at the expense of the peripheral elements while the endothelial lining of the vessels remained perfectly normal. The cystic form of angioblastoma of the tongue has not hitherto been reported.

RICHARD KEMEL, M.D.

PHARYNX

Martin H and Sugarbaker E L. Cancer of the Tonsil. *Am J Surg* 1945; 5: 155

The authors' report is based upon 157 unselected consecutive cases of cancer of the tonsil including all patients in all stages of the disease who applied to the Memorial Hospital from 1931 to 1935 inclusive. From an analysis of the admission records of the Memorial Hospital, cancer of the tonsil comprises 8 per cent of all cancer of the upper respiratory and alimentary tracts and about 2 per cent of all human cancer. Of the structures of the pharynx, the tonsil (21 per cent) is second only to the extrinsic larynx (37 per cent) in frequency as the site or origin of malignant growths. In the present series the average age was about fifty-seven years on admission and about 30 per cent of the patients were in the sixth decade. Eighty-six per cent of the cases occurred in males and 14 per cent in females, a sex distribution which is almost identical with that of cancer of the tongue.

In growths of the palatine tonsil as in other forms of pharyngeal cancer, there appears to be no outstanding etiological factor. Hot foods and drink which are held at least momentarily in the oral cavity pass rapidly through the pharynx during the act of swallowing. About 70 per cent of the patients admitted the use of tobacco, usually a smokers but at least this percentage of addiction is found in normal male adults of corresponding age. Only 3 per cent of the Wassermann tests taken gave positive reactions. Poor dental and oral hygiene was observed in the majority of the patients but since most of them were from the less fortunate economic group such deficiencies were to be expected and in the present series were no more prevalent than among the skin cancer patients in the authors' clinic.

The average duration of symptom (usually pain or soreness of the throat) before admission was seven months as compared to fifteen months in cancer of the lip, ten months in cancer of the nasopharynx and five months in cancer of the tongue and of the floor of the mouth respectively.

Cancer of the tonsil begins either in the tonsil itself or on one of the tonsillar pillars. Small lesions or moderately advanced lesions are the exception. In the average case the growth on admission has a diameter of about 4 cm. so that the exact site of origin cannot be determined and in these cases the growth has usually invaded the soft palate, both tonsillar pillars and the adjacent edge of the tongue. In cancer of all parts of Waldeyer's tonsillar ring, metastases play an early and prominent rôle. In the present series about one third of the patients noted enlarged cervical nodes as the first symptom. On admission clinically demonstrable cervical metastases were present in 76 per cent of the cases. The first node involved (in about 95 per cent of all cases) was the subgastric which lies in the upper deep cervical or jugular chain just above the bifurcation of the common carotid artery. Occasionally the first pal-

pable metastatic node appeared in the submaxillary region and more rarely in the middle and lower parts of the deep cervical chain. It is a curious fact that dissemination below the clavicle to the viscera appears to occur only rarely.

A histological classification of the growths in the authors' series showed that the epidermoid carcinomas (84 per cent) and the lymphosarcoma (16 per cent) present about the same relative distribution of these two tumors in a series of nasopharyngeal cancer recently studied by the authors.

Although a clinical diagnosis is not difficult in the average case of tonsillar cancer, a biopsy should always be made before treatment is instituted. It should be realized that treatment for cancer, whether by radiation or surgery, must be aggressive and therefore it is always attended by definite risk, discomfort and expense. Without biopsy the clinical diagnosis will inevitably be erroneous in an occasional case. If the treatment is to be by radiation not only should a tissue specimen be removed from the tonsil but an aspiration biopsy should be made for purposes of record to confirm the diagnosis of metastatic nodes. From an analysis of the present series it is apparent that an erroneous diagnosis of syphilis, made less often in cancer of the tonsil than in malignant growth of the tongue, Gummer's of the tonsil (which cannot be differentiated clinically from cancer) is exceptionally rare. Papillomas have a warty papillary appearance and show a greater tendency than cancer to fungate from the mucous surface. Rarely patients with leukemia present markedly enlarged tonsils as well as generalized lymphadenopathy but errors in diagnosis cannot occur with proper laboratory and physical examination.

There is no structure of the pharynx more accessible to surgical removal than the tonsil and yet one must conclude from its history that the operative treatment of cancer of the tonsil justifies Despond's epithet of urgency of despair. The reasons for the failure of surgery in cancer of the tonsil are first that the primary lesion is extensive and nonoperable when first seen and second that 75 per cent of all cases have metastases on admission. While surgery offers little radiation on the apy is particularly stable in tonsillar cancer. This accessibility to irradiation both through the skin of the neck and through the mouth by a peroral portal. Cancer of the tonsil in general is among the more radiosensitive of pharyngeal and oral tumors and the upper portion of the pharynx in contrast to the hypopharynx can be heavily irradiated without serious impairment of any vital function or the bringing on of grave complications. The number of permanent cures can be increased and the percentage of survival toward squelched by the use of submaximal doses of fractionated x-radiation supplemented in most cases by the implantation of small doses of radon seeds in the residual tumor, thereby treating the primary lesion or in the immediately adjacent metastatic nodes.

The net five-year cure rate in the authors' series was 18 per cent
JOSEPH K. NARAT, M.D.

Montandon, A. Pendulous Reticulosarcoma of the Lingual Tonsil (*Réticulaire sarcome pendulaire de l'amygdale linguale*) *Rev. med. de la Suisse Rom.*, 1941, No. 1, p. 20

Montandon reports a case of pendulous reticulosarcoma of the lingual tonsil in a woman sixty-one years of age, the chief symptoms were a sensation of a foreign body in the throat and difficulty in swallowing and in talking. Upon inspection of the oral cavity and throat without any instrument, a tumor was seen which appeared to be attached to the left palatine tonsil. When the tongue was depressed with a spatula, however, the tumor disappeared, the palatine tonsils were entirely normal. Examination with the laryngeal mirror showed that the tumor arose from the lingual tonsil by a short pedicle. Examination of a biopsy specimen from the tumor showed a reticulosarcoma. As the tumor could be surgically removed, and from its histological nature was also radiosensitive, both surgery and radiation were employed in its treatment. After a preliminary x-ray treatment, the tumor was removed by electrocoagulation, postoperative radiation was given in fractional doses until a total of 6,000 roentgens (with 2 mm. of copper filter) were given in 30 treatments. The patient has been kept under careful observation and has shown no signs of recurrence in more than three years.

Tumors of the lingual tonsil are of rare occurrence, tumors of the palatine tonsil occur more frequently, but reticulosarcomas are of rare occurrence in this region. In spite of the fact that reticulosarcomas are known to be radiosensitive, it is a matter of precaution to remove surgically an easily accessible tumor—such as the one in the case reported—and preferably by electrocoagulation, in addition to giving intensive irradiation. This combined treatment has given good results in the case reported in view of the fact that the prognosis of reticulosarcoma is definitely unfavorable. ALICE M. MEYERS

NECK

Cattell, R. B. The Management of Hyperthyroidism Complicated by Other Conditions. *Pennsylvania M. J.*, 1941, 44: 685

The surgical treatment of hyperthyroidism is very satisfactory and the mortality is low, but if hyperthyroidism is complicated the mortality is considerably higher. At the Lahey Clinic approximately 12 per cent of all toxic patients had complications.

More than 100 children, aged thirteen years, or less, have been operated upon for hyperthyroidism. Despite the reluctance of some pediatricians to advise operation, it is important because of the effect of the toxic state upon ossification, and the possibility of a permanent change in the eyes because of the exophthalmos. The child requires a longer period of preparation than the adult, the operation should be

done in at least two stages, with an interval between operations of six weeks, and a relatively larger thyroid remnant should be left.

In the aged, exophthalmos is commonly absent, the pulse rate is below 90, and the basal metabolic rate between 15 and 30 per cent. Loss of weight is the best indication of the disease. A long period of preparation is required, after which the operation is done in three stages, with an interval of from four to six weeks between the first and second stage, and six weeks between the second and third stage. The administration of Lugol's solution is continued throughout the period. The operative mortality, even with extreme conservatism, is double that of the total toxic group.

The group with cardiovascular disease can be subdivided into patients without and patients with either congestive failure or abnormal rhythm, or both. Only the latter need special preparation. The pre-operative treatment of these patients is directed toward the relief of the decompensation and the routine preparation with rest, Lugol's solution and a high calory diet. No attempt is made to restore the rhythm to normal by quinidine pre-operatively. From two to three weeks are required for preparation. The operation is done in stages with an interval of six weeks between each stage. The digitalization is continued throughout the interval. Radical subtotal thyroidectomy should be done in all of these cases to obviate persistent or recurrent hyperthyroidism. Cyclopropane is the anesthetic of choice, with a very large admixture of oxygen. The patients are placed into oxygen tents postoperatively. Quinidine is given if the rhythm does not return to normal within four or six days. The mortality rate in this group of patients is 4.3 per cent or five times that of the total group.

Pulmonary tuberculosis is not an uncommon complication. Treatment should be directed to the relief of the hyperthyroidism first. The usual thyroid measures are employed for three weeks. Unless the hyperthyroidism is very severe the operation can be done in one stage. Local anesthesia or cyclopropane is the anesthetic of choice.

Diabetes occurs in 15 per cent of thyrotoxic patients. The diagnostic criteria for elderly patients are valid for these cases, occasionally a therapeutic trial with Lugol's solution is necessary, and if the reaction is positive a subtotal thyroidectomy should be advised. Operations in stages are twice as frequent in diabetic patients and the mortality is double that of the general group. The diabetes is usually less severe after thyroidectomy.

Jaundice occurs frequently in hyperthyroidism and the prognosis is serious. If biliary-tract disease is demonstrated its treatment is postponed until after the relief of the thyroid toxicity.

Pernicious anemia is not a frequent complication, if encountered, it should be relieved before operation. Iodine should be continued in the meantime. In severe secondary anemias, the hemoglobin should be raised to 70 per cent before operation is attempted.

Myasthenia gravis is an uncommon complication of serious prognostic significance. Treatment with glycine, ephedrine and Lugol's solution should be continued for a long time. Operation is done under intratracheal anesthesia. Careful postoperative supervision should be observed and if there is any evidence of respiratory embarrassment a tracheotomy should be done at once.

Cancer of the thyroid is merely a coincidental finding. Its treatment in the advanced cases consists in radical hemithyroidectomy of the affected side and in subtotal thyroidectomy of the other lobe. In the more advanced cases the thyroid is extirpated as completely as possible and postoperative irradiation is employed.

In pregnancy subtotal thyroidectomy is advised up to and including the eighth month; the operation may then be performed (with rare exceptions) in one stage. Women are advised not to become pregnant within one year following a thyroidectomy.

Patients with infections and mild respiratory conditions are candidates for thyroid crisis and should not therefore be operated upon. Dental operations should be postponed for a month following thyroidectomy. In the event of acute appendicitis or cholecystitis patients may be operated upon during the pre-operative period with all due precautions.

Conditions requiring optional surgery should be considered in three to six months following thyroidectomy; operations for urgent conditions such as malignancies should be performed in a period of two weeks following thyroidectomy.

Thyroid crisis should be treated as follows:

From 3,000 to 5,000 c.c.m. of fluid containing from 25 to 30 gm. of salt are administered by continuous intravenous drip and morphine and barbiturates are given in adequate quantities. From 200 to 500 gm. of glucose in a 5 or 10 per cent solution are given by the slow drip method and 100 minims of Lugol's solution daily are considered adequate, 50 drops being added to the intravenous drip, 30 drop may be added to the subcutaneous saline. All patients are placed in tents with an oxygen concentration of from 40 to 50 per cent. The operation which is always done in stages is delayed for three or four weeks.

FRED S. MODERN, M.D.

Siedek H. Total Thyroidectomy in Cardiac Patients (Total Thyroidektomie bei Herzkranken). *Ergebnisse in Med. K.* 4: 94, 59.

Because of the central position of the thyroid in the sympathetic system, the possibility of penetrating into this system by means of total thyroidectomy offered an interesting problem particularly since in no other category of disease do the sympathetic nerves play a more important part than in cardiac and vascular ailments. In Europe outstanding preliminary work in total excision of the thyroid gland in cardiac patients was done by the schools of von Eiselsberg and Hachenegg, Breitner and Kasjar frequently observed a sudden disappearance of

existing cardiac discomforts after thorough extirpation of goiters. Total thyroidectomy was further more carried out successfully by Sudeck, Schmieden, Cilman and Kay. It was remarkable and surprising that manifestations of deficiencies were very rare in older patients and that the most critically ill were able to stand these interventions well. The author adds the comment that today every internist is acquainted with the fact that all cardiac defects which are accompanied by hyperthyrosis should be operated upon even if the cardiac condition appears critical and that it is detrimental to a professional mistake to use only medication in such cases.

In Germany it was Isander who was the first to report on a larger number of cardiac patients who were treated successfully by means of total thyroidectomy. The physician may pursue two courses in the treatment of serious heart defects: either the efficiency of the circulatory system and particularly of the heart is strengthened so that the performance meets the requirements or the requirements are diminished and the circulatory work is reduced either by limitation of muscular exertion or by the use of sedatives. The latter course was pursued by Blumgart who on the basis of a personal observation suggested a total extirpation of the thyroid gland in cases of cardiac ailments which would not yield to other treatment. It is to be noted however that total thyroidectomy does not result merely in a lowered basic balance and a calmer heart action but that other manifestations may appear which are by no means welcome.

Zondek and Eppinger have described cases of cardiac myxedema which may result in dilatation and manifestations of failure symptoms which disappear again after the administration of thyroid preparations. Furthermore it is important to note that a reduced action of the thyroid gland is accompanied by a pronounced rise of the cholesterol level in the blood. This high cholesterol level should by no means be judged with indifference particularly in view of the vascular changes which are often observed during the course of myxedema.

Reports of about 450 cases of serious cardiac defects treated to date by total extirpation of the thyroid gland were found in the literature of these almost 100 cases are from Viennese clinics while the greatest number were from the American literature. Even after a very careful evaluation of the clinical material observed the result is a 58 per cent improvement in cases with serious cardiac defects and a 83 per cent improvement in cases of angina pectoris. Therefore the author states that in observing the final results one must concede that total thyroidectomy in cardiac patients represents an absolute therapeutic asset and that this is particularly striking when one realizes that most of the cases published are considered refractory to other treatments. By proper evaluation of the indications patients may be promised a 5 per cent chance for improvement which chance increases considerably with a angina pectoris.

More than one-half of the patients who were operated upon were able to return to economic life. If myxedema appears after a total thyroidectomy which, astonishingly, is by no means the case in all such patients, this condition must be neutralized by a carefully graduated administration of thyroid preparations. In cases of angina pectoris and complete thyroidectomy, it is important to ascertain whether the effect of adrenalin upon the sympathetic system has been reduced. Regarding the administration of thyroid substance, it is important to note that in case of myxedema small doses may lower the cholesterol level of the blood, but the basic balance is not increased thereby, the unpleasant danger of vascular sclerosis may thus be averted in time. Postoperative disturbances observed after total thyroidectomy are impotence in men and apoplexy in patients with cerebral sclerosis. Contraindications are, therefore, mainly the sclerosis, active coronary defects, active infections, repeated lobar infarcts, and defects of the mitral valves with absolute or prevalent aortic insufficiency.

The author closes his discussions with the statement that cardiac and vascular therapy has taken a new course which should not be disregarded or rejected *a priori*, for it offers an important source of knowledge and, with proper application, most beneficial results.

(SUNDER-PLESSMANN) HILDA H. WHEELER

Yoffey, J. M. The Lymphatic Pathway for Absorption from the Nasopharynx, Absorption of Dyes, Absorption of Proteins, Absorption of Viruses and Bacteria. *Lancet*, 1941, 240: 529.

Definite functional lymphatic pathways have been found particularly in the case of the deep cervical lymphatics. These have been studied from their origin in the mucous membrane of the nose, accessory air sinuses, and pharynx to their drainage into the deep cervical lymph duct, which in turn empties into the great veins. The cervical duct in man passes through one or more lymph nodes before finally reaching the great veins. To demonstrate the cervical pathway, a solution of a vital dye was dropped into each nostril. At the end of two hours, on dissection of the side of the neck, the pathway was found to stand out sharply. This method actually shows the living and functioning system of vessels.

Absorption of dyes. The experiment just described demonstrated the absorption of dye through the normal nasal mucosa. The dye quickly passed through the mucous membrane and entered the lymph and appeared in a cannula in the lymph duct close to the blood stream. Only a few minutes were required for the passage of the dye through the nasal mucosa but there was some delay before it reached the cannula. Some of the dye, after passing through the mucous membrane, was absorbed into the blood stream.

Absorption of proteins. Egg albumin with a molecular weight of 34,500 was found to traverse the nasal mucosa and enter the lymph stream just as readily as the vital dye with a molecular weight of

960. Serum albumin with a molecular weight of $72,000 \pm 3,000$ was only occasionally found in the lymph stream after nasal instillation. Horse serum dropped into the nose was never detected either in the lymph or in the blood. The fact that the nasal mucosa would let through the vital dye but not horse serum suggested its use as a biological dialyzing membrane. It has been suggested that the vital dye T-1824 in the blood combines in some way with the plasma proteins—a point of some importance in connection with the use of T-1824 in estimating the blood volume. Can sufficient foreign protein be absorbed to induce a state of hypersensitiveness, or if such a state is already present, to bring on anaphylactic shock? The absorption of proteins from the nose also has a bearing on the question of immunization by nasal instillation of toxins and antitoxins. As far as the size of the molecule is concerned, the limit of absorbability seems to be represented by serum albumin with a molecular weight of 72,000. In diphtheria, the toxin has a molecular weight of 70,000 and the antitoxin 150,000.

Absorption of viruses and bacteria. Viruses are very much larger than any of the protein molecules and one would hardly expect that they would pass directly through the nasal mucosa. In using one of the larger viruses (vaccinia) this was found to be the case. This is complicated by the fact that one is not dealing with the passage of particles but of particles which are capable of multiplication and direct extension through the mucosa. Apparently during the first twelve hours, the virus is establishing itself by multiplying in the nasal mucosa. With the cervical duct cannulated low down in the neck, it was found that the lymph nodes through which the virus had passed did not appreciably retard or prevent such passage. This passage depends upon two factors. First, the viruses become attached to living cells, in this instance the small lymphocytes. Second, the lymphocytes are continually leaving the lymph nodes in large numbers, therefore, the virus leaves the lymph node in the lymphocytes and not in the fluid lymph. It appears that the chief function of lymph nodes is to act as barriers to noxious particles in the lymph stream and prevent them from reaching the blood. This must be reconsidered. In the case of virus such as that of vaccinia, the lymph node, far from preventing the spread of infection, actually encourages it. Virus reaches the node, multiplies there, and then leaves it and is carried to the blood stream by the lymphocytes in the efferent lymph. The virus may be protected in its passage against any neutralizing principle. Second, the lymphocyte and virus can migrate through the walls of the capillaries in all parts of the body. Third, one of the most striking pathological changes in virus diseases is the perivascular accumulation of lymphocytes. It is possible that the virus-carrying lymphocytes may be responsible for the first introduction of virus in the affected region.

The nasopharynx provides the portal of entry for some of the most common virus diseases—measles,

the common cold smallpox chickenpox and poliomyelitis. In some experiments with the virus of poliomyelitis which was introduced by intranasal instillation the virus was never detected in cervical lymph nor in the lymph nodes. It is possible that poliomyelitis may be specifically neurotropic and that the virus will not function in other than nervous tissue. The presence of virus in the blood limited to the white blood cells has been noted in a number of virus diseases. If the virus employed happens to have developed neurotropic tendencies a postvaccination encephalitis may be expected to occur.

The absorption of bacteria presents the same general problem as the viruses. The particle size is not the only determining factor for one is dealing with particles which can multiply in a susceptible host. The experimental observation is that some bacteria can pass through nodes and indicates an imperfect barrier function. RICHARD J. B. VERT JR. MD

Brighton G. R. Altmann F. and Hagan C. J.
Reactions of Laryngeal Tissues Following Extended Fractional Roentgen Irradiation. *Arch Otolaryngol* 194 33 63

In reviewing 16 cases of intralaryngeal and extralaryngeal neoplasms occurring in men from forty

eight to seventy-eight years of age the authors observe that in tumors in the early stages protracted fractional irradiation causes rather intensive necrosis of the surface epithelium damage of the glandular epithelium and inflammatory reaction mainly of the superficial layers of the mucosa. The latter reaction is characterized by intense fibrinous exudation with formation of a pseudomembrane and vascular changes of a specific character. Later there is a regeneration of the epithelium as well as more marked fibrosis of the superficial layers of the mucosa with definite decrease in the subepithelial lymphatic infiltration.

There may also be some obliteration of the small and medium sized vessels scattered atrophy of the glandular lobules and frequently chronic edema. Occasionally there may be secondary involvement of the musculature by the fibrosis. However there are no changes of the musculature bone or cartilage primarily due to radiation. The reaction of the tumor tissue is inconsistent with the histological structure but seems connected more definitely with the location of the tumor. The criterion of the location however is not sufficient to determine the exact results of irradiation of the tumor tissue.

NOAH D. FABRICANT MD

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS, CRANIAL NERVES

Storch, T J C von, and Karr, H H Reduction of Pain and Other Undesirable Reactions Due to Pneumo-Encephalography *New England J Med*, 1941, 224 755

To secure good encephalographic x-ray pictures without causing violent or dangerous postencephalographic symptoms in the patient is assuredly a goal desired by everyone using this valuable diagnostic procedure

The authors suggest the use of nembutal or sodium amytal to allay apprehension, and they point out that vomiting can in most cases be avoided by the restriction of anything by mouth and the subcutaneous injection of from 1/150 to 1/50 of a grain of atropine sulfate an hour before the lumbar puncture Morphine is to be avoided They like to use a general anesthetic for encephalography, and with the patient in a chair used especially for this procedure and after the administration of atropine sulfate, they *slowly* inject a 5 per cent solution of pentothal sodium in sufficient quantity to produce the desired depth of narcosis They stress the importance of the *slow* injection of the drug

They discuss the various gases used for encephalographic studies, among them, air, oxygen, ethylene, carbon dioxide, nitrogen, helium, and freon They apparently use air in most cases Ethylene is found to be the least irritating, like oxygen, it is rapidly absorbed and therefore requires fast work in the x-ray department They point out that the introduction of small amounts of gas will demonstrate only the most obvious lesions, larger amounts 100 ccm or over, cause the severe and prolonged headaches which one commonly finds in these patients, but these larger amounts of gas result in better diagnostic films The two-needle technique is preferred by the authors, with as little manipulation of the patient as possible during the test

Postencephalographic measures include the administration of liberal amounts of fluid, sedatives (but no morphine), and the breathing of 95 per cent oxygen to hasten the absorption of the intraventricular gas

JOHN MARTIN, M D

Childe, A E Calcification of the Chorioid Plexus and Its Displacement by Expanding Intracranial Lesions *Am J Roentgenol*, 1941, 45 523

An analysis of 1,000 consecutive skull examinations revealed calcification to be present in the chorioid plexus in 112 cases (11.2 per cent) In 7.4 per cent the calcification was bilateral The incidence of such calcification increased in direct proportion to age The location of this calcification almost always corresponded to the position of the glomus In lateral roentgenograms the calcification

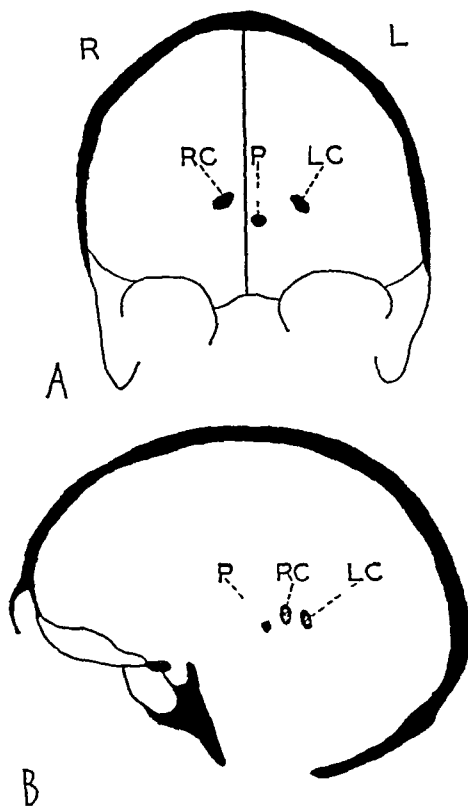


Fig 1, A and B Anterior and medial displacement of calcification in the glomus of the right chorioid plexus produced by a large extradural hemorrhage covering the posterior part of the parietal lobe and also the occipital lobe RC, right chorioid, LC, left chorioid, P, pineal gland

in the glomus was situated above and posterior to the position of the pineal gland, and in anterior-posterior views it appeared from 2.5 to 3 cm to either side of the midline The calcified areas varied in size from minute specks to dense areas over 1 cm in diameter They were rounded or kidney shaped and sometimes had a quite typical appearance

Eight cases in the course of twenty-one months showed displacement of a calcified glomus These cases are reported in detail with skull diagrams showing the locations of the calcified areas Another case report is included to show that an anteriorly situated tumor, even though it was large, failed to displace the glomus appreciably

The author states that macroscopic calcification in the chorioid plexus elsewhere than in the glomus is quite rare Consequently even a minor degree of apparent displacement of such a calcified area sug-

gents a ready neoplasm With marked displacement or when the calcification assumes the characteristic rounded or kidney shaped form the evidence is much more definite It is difficult to interpret a slight apparent displacement of the glomus when it is unilaterally calcified True anterior posterior and lateral films may not be obtained because minor degrees of rotation of the skull will give the appearance of displacement Stereoscopic films are essential to correct interpretation The lack of demonstrable displacement of the choroid glomus is not sufficient evidence to exclude an expanding lesion situated in the anterior part of the skull JOHN L. LEONQUEST M D

Herron R V Papilloma of the Choroid Plexus
J A S S 1941 42 735

In this communication the author reviews 80 cases of papilloma of the choroid plexus from the literature and reports 1 case of his own

Papilloma of the choroid plexus is a rare tumor the incidence being not quite 0.4 per cent It is seen to occur at any age with a great predilection for the first decades of life

The tumor occurs with about equal incidence in the lateral and fourth ventricles next often in the third ventricle Of the tumors located as of the third ventricle 2 had extensions into the fourth ventricle by way of the aqueduct of Sylvius 2 had extensions into the lateral ventricle and 2 had extensions into both lateral ventricles by way of the foramina of Monro 3 that only 6 were confined to the third ventricle

With in the first decade of life the tumor occurs almost exclusively in one of the lateral ventricles in the second third fourth and fifth decades it may occur anywhere but most commonly in the fourth ventricle

The percentage of seeding is highest with tumors of the lateral ventricles The interpretation of evidence of a predisposition in tumors of this location as to the fact that none of the cases of seeding the ptermeron occurs within the first decade of life from these observations it is perhaps justifiable to conclude that had not the tumor killed its host early the incidence of seeding from the lateral ventricle would be much higher The explanation for seeding is obscure but ready a simple one that trauma to a wall of growing tumor mass with a lateral ventricle (as there is almost universally associated internal hydrocephalus) forces tumor cells which are carried away by the cerebrospinal fluid Seedlings appear to take place by any of the cerebrospinal fluid since all secondary implants save possibly that in the single case of Hall and Ventres have shown the nodules to be in the subarachnoid space The entire number of cases in which seeding occurred represent 1/5 of the cases collected in this article

Internal hydrocephalus is almost universal accompaniment of the kind of tumor The distribution of the tumor is therefore bilateral but the relation of the seeding to the

It seems more than probable that the tumor may function in the capacity of a normal choroid plexus and that the associated internal hydrocephalus may be caused in which it is not due to a mechanical obstruction is most probably due to an overproduction of cerebrospinal fluid

The life history of the tumor shows that it progresses rapidly in the first decade and slowly in the other decades

The clinical diagnosis of this tumor is a problem indeed Its rarity causes it not to suggest itself as a diagnostic possibility It can rarely be lateralized without the aid of air studies Examination of the cerebrospinal fluid is of little aid in diagnosis A tumor of this kind should suggest itself in the case of an infant with signs of obstructive or communicating hydrocephalus particularly when there are lateralizing cerebral signs and xanthochromic fluid can be obtained by puncture of the fontanel or other puncture This type of tumor in the child is extremely vicious in that its symptoms are obscure it grows to enormous size it is difficult to handle surgically because of its vascularity and it causes death quickly On the other hand papilloma of the choroid plexus in the adult is more benign though often having histologically apparent malignant characteristics

Ten deaths occurred among 30 operative cases The greatest morbidity occurs in the middle decades of life as well as the greatest recovery percentage since in only a few instances has the diagnosis been made and operation attempted with a patient under the age of ten years Despite this fact there does not seem to be a greater morbidity in adults from papilloma of the choroid plexus than from a rather common tumor similarly located Occasionally it recurs

DAVID J. FURSTMAN M D

Salmon W Th Otorhinological Diagnosis in 30
Verified Cases of Tumor of the Brain (Otorhinological and neurologic material) nos 151-180
(in the otolaryngology) R J M D 1941 55 1

Study of the labyrinth is very important in certain intracranial lesions which destroy or exert pressure on the centers through which the cochleovestibular nerve passes In some cases tumors of the posterior fossa or subarachnoid tumors may be located by examination of the labyrinth The labyrinth is the chief organ of equilibrium and its intralabyrinthine muscle tone Disturbances of equilibrium or muscle tone are shown by Romberg's sign of rotation pointing vertigo spontaneous or provoked nystagmus and the various labyrinthine tests devised by Barany which are described in detail

Little is known of the signs of signs of central course of the vestibular nerve The author has verified a diagrammatic sketch of the course of the cochlear and vestibular nerves which is in accordance with the findings of Isaac Jones In the most lateral part of the nerve fibers from the vestibular nucleus but in the posterior part of the fibers from the vestibular nucleus only from the central nucleus Two cases

which show this are described and illustrated. After caloric stimulation the horizontal canals showed normal postcaloric reactions while those of the vertical canals were completely abolished.

A review is given of 30 cases of brain tumor verified by operation or autopsy and treated in the past two years in the neurological clinic of Austregesilio and the neurosurgical clinic of José Portugal. Eleven of these tumors were in the posterior fossa and 2 in the pons, they were diagnosed by examination of the labyrinth.

The diagnostic value of examination of the labyrinth is lessened if there is a high degree of intracranial tension. Circumscribed tumors of the cerebellum do not cause spontaneous nystagmus. The differential diagnosis between central and peripheral lesions of the labyrinth is discussed. Vertical nystagmus is of central origin. Nystagmus toward the side of the injured labyrinth is central in origin. Spontaneous or provoked nystagmus with predominance of the slow phase is of central origin but is not pathognomonic of a lesion of the posterior fossa. The postcaloric reactions are valuable in localizing a central lesion. Disproportion between the duration of nystagmus and vertigo after rotation is a sign of a central lesion. The loss of vestibular function with preservation of cochlear function suggests a central lesion. The finding of all these clinical symptoms must be supplemented by neurological, ophthalmological, roentgenological, and serological examinations in order to make an accurate diagnosis of localization.

If in intracranial tumors that have been developing for as long as two years there are no cochleovestibular disturbances, tumor of the posterior fossa can be excluded. It is as important to exclude tumor of the posterior fossa as it is to localize it there, as it enables the surgeon to avoid operating through the posterior fossa, which is a difficult and dangerous route. Next to nystagmus, falling, or at least oscillation, is the most important postcaloric sign.

An acoustic chamber for determining the loss of hearing in decibels is described and illustrated.

AUDREY G. MORGAN, M.D.

Lysholm, E. Roentgen Picture in Meningioma of the Tentorium (Das Roentgenbild bei Tentoriummeningeom). *Acta radiol.*, 1941, 22, 303.

Meningiomas of the posterior cranial fossa may be basal, as those of the clivus and those situated laterally to the clivus, or they may originate from the dorsal parts of the fossa, the sigmoid groove, the dorsal part of the petrous bone, or the region of the internal auditory meatus. There are also transitional forms between basal meningiomas and those of the medial part of the petrous bone. Meningiomas which originate from the tentorium are placed in a special group. In his monograph on meningiomas published in 1938, Cushing reports 3 personal cases of meningioma of the tentorium and 1 case described by Foennis. He calls attention to the small number of cases that have been reported up till now and sus-

pects that this gives a false impression of the frequency of occurrence of these tumors, he states that, like the other meningiomas of the posterior cranial fossa, those of the tentorium have a remarkably good prognosis.

Since 1938, Lysholm has observed 4 cases of meningioma of the tentorium which illustrate the various roentgen pictures that may be expected in these cases because of differences in localization and manner of growth. In the first case, a woman, aged fifty years, had had symptoms of brain tumor for five months, clinically, the diagnosis between tumor of the corpus callosum and tumor of the brain stem could not be decided, ventriculography showed a tumor of the right cerebellar hemisphere. Operation in two stages revealed a plum-sized meningioma originating from and not growing through the tentorium.

In the second case, a woman, aged forty-one years, had had symptoms of brain tumor for seven years, the clinical diagnosis was tumor in the third ventricle or below the tentorium, ventriculography showed a tumor in the upper part of the vermis, operation in two stages disclosed a plum-sized meningioma of the tentorium high up in the middle line, the tumor had not grown through the tentorium.

In the third case, a woman, aged thirty-one years, had had headaches, vomiting, double vision, and decrease of vision for four months, objectively she had bilateral stasis papilla. Roentgen examination of the skull showed generally increased pressure and enlargement of the sella turcica, and ventriculography revealed a tumor in the middle line above the fastigium. Operation revealed at this site a meningioma of the tentorium, the size of a hen's egg, which had grown in part through the slit in the tentorium. Subsequent examination of the ventriculogram in the light of the operative findings showed that the supratentorial break typical for cerebellar tumor was absent. The aqueduct was displaced forward more evenly but did not present the type described by the author for tumors of the quadrigeminal plate, and the aspect of the posterior part of the third ventricle resembled more the picture found in pinealoma. Consequently, the ventriculogram showed a tumor in the middle line below the tentorium and its extension above the tentorium, and the specific diagnosis could have been made.

In the fourth case, a man, aged forty-six years, had had headaches, dizziness, and decrease of vision for eight months, the clinical diagnosis was probable meningioma of the right olfactory region, ventriculography showed an occipital and subtentorial tumor on the right, operation disclosed a meningioma, the size of an orange, which had grown through the tentorium.

In cases like the first, in which the tumor originated from the lateral part of the lower surface of the tentorium without growing through it or protruding into the middle cranial fossa, one must be satisfied with a local diagnosis; a specific diagnosis is possible only when typical meningioma calcifica-

tions can be demonstrated. This also applies to cases like the second in which the tumor originated from the middle line without invading the middle cerebral fossa. However a specific diagnosis becomes possible in cases in which the meningioma has grown through the tentorium and produced changes in the third ventricle and the aqueduct as in the third case or in the lateral ventricle the aqueduct and the fourth ventricle as in the last case.

The practical conclusion is that it is necessary to examine the third and fourth ventricles as well as the lateral ones to make a specific diagnosis possible in tumors which displace the occipital horn.

RICHARD KEMEL, M.D.

Grant F. C. and Weinberger L. M. Experience with Intramedullary Tractotomy. Relief of Facial Pain and Summary of Operative Results. *J. Neurosurg.* 94: 42-68.

It has long been known from the study of pathological conditions affecting the brain stem that there is an anatomical separation as well as a physiological dissociation of the fibers of the trigeminal nerve immediately on their entry into the brain stem. The fibers conducting the modalities of pain and temperature turn downward and in company with the nucleus of the spinal tract of the fifth nerve run throughout the length of the medulla oblongata and into the upper cervical portion of the cord. During their course they emerge from under cover of the restiform body and take a superficial position on the lateral surface of the medulla. In this situation they form a distinct elevation on the surface of the medulla—the tuberculum cinereum (Fig. 1). In the closed portion of the medulla the tuberculum cinereum lies below the restiform body and above the olivary eminence. The fibers mediating touch sensation on the other hand turn upward at the point of entry into the brain stem and end in the main sensory nucleus of the trigeminal nerve and thence by the secondary neuron ascend to terminate in the sensory nucleus of the thalamus.

In 1938 Sjöqvist of Stockholm, Sweden, on the basis of his studies on the organization of the central trigeminal system, proposed that section of the descending tract of the trigeminal nerve in the medulla could be used to relieve facial pain. An obvious theoretical advantage of this procedure was that touch sensation could be spared and that the face would not feel cold, stiff and numb as after section of the sensory root. A second advantage was the sparing of the motor component. A third was the elimination of neuroparalytic keratitis since some sensation would be retained in the eye. Sjöqvist also expressed the belief that such a central interruption would prevent postoperative dysesthesias. In his monograph published in the autumn of 1941 he reported on the results in 9 patients in whom the descending tract of the trigeminal nerve was sectioned in the medulla oblongata. Although his results in terms of relief of pain were valuable largely because the operation was a non-invasive and experimental procedure,

he established without question that it is possible to render the face analgesic and to relieve pain without grossly disturbing touch sensation.

Since his report there have been several other publications on the surgical results and physiological effects of intramedullary tractotomy. Thirty-seven cases have been reported in the literature.

A unilateral suboccipital craniectomy is performed with removal of the posterior ramus of the foramen magnum and the arch of the atlas. After the dura is opened the arachnoid membrane of the cisterna magna is torn and the cerebrospinal fluid allowed to escape. The tonsil of the cerebellum is gently retracted until the lateral aspect of the medulla with the emerging roots of the lower cranial nerves is exposed and the fourth ventricle is visualized. According to Sjöqvist, the location of the incision is determined by the site of the lowermost vagal rootlet. At this point an incision is made into the lateral aspect of the medulla beginning just dorsal to the rootlet and extending dorsally for 3.5 or 4 mm. The depth of the incision is from 3 to 4 mm. This cut divides the descending tract of the trigeminal nerve in the tuberculum cinereum and theoretically at least avoids the important nuclei and tracts in the neighborhood.

According to the authors this incision is too high and makes it difficult if not impossible to avoid injuring the restiform body, the lateral diencephalic nucleus by an incision in this region. The predominant neurological disturbances the authors encountered in the performance of this operation were Sjöqvist's direct ones were due largely to injury of the restiform body. In the last 3 cases they used the obex of the fourth ventricle and the olive as landmarks and cut the tuberculum cinereum at a level of 4 mm below the obex and about 1 mm below the olive. This site is from 12 to 14 mm more caudal than that recommended by Sjöqvist. With this modification the authors have not observed permanent neurological disturbances. The results in 17 cases were as follows:

In 12 cases complete analgesia in the distribution of all three divisions of the trigeminal nerve immediately followed the operation. In a few instances there were small islands in which a few pain points could be found. In 2 cases there were continuous burning sensations and hypalgia which did not conform to the conventional divisional territories of the face. In 1 case the first division was entirely spared with analgesia of the lower two divisions. In 1 case the sensory result was unsatisfactory; there being only mild hypalgia in all three divisions.

Touch sensation was found to be slightly decreased in all instances in which analgesia existed but this was difficult if not impossible to determine with ordinary cotton wool testing. The loss expressed itself as a diminution in the number of touch points per square centimeter with or without a change in threshold.

The disturbances in temperature sensation were capricious and did not conform to the loss in pain

sensibility Sometimes with complete analgesia there was fairly good appreciation of temperature, and sometimes there was complete thermanesthesia. Occasionally heat would be appreciated but not cold, or vice versa. In an area of moderate hypalgesia, temperature might be well appreciated or, on the other hand, not at all.

In 15 cases there was complete relief of pain following tractotomy. This included all cases of major trigeminal neuralgia. In 1 case there was marked but not complete relief. In 14 or 15 cases there was a wild in-co-ordination of the homolateral arm. Nystagmus was present in a few instances. The static cerebellar disturbances tended to decrease and by the end of a week were slight in most cases. In several instances, however, in-co-ordination of the arm persisted for a number of weeks. In spite of the absent or greatly diminished static cerebellar signs by the end of a week, the patient showed considerable disturbance in gait. This was out of all proportion to the in-co-ordination of the extremities that was elicited while the patients were in bed. The disturbance in gait was characterized by the patient's standing with the feet apart, staggering and falling to the homolateral side, and peculiarly inclining the upper part of his trunk to the homolateral side, reminiscent of the posture of a person leaning into a strong wind. By the end of two weeks these disturbances in gait had decreased or largely disappeared in most cases.

In 4 cases there was weakness of the homolateral arm, which in 3 persisted past the time of discharge.

In 5 cases the patients complained of numbness and tingling in the homolateral hand and fingers, which again in 3 instances persisted until discharge. In 4 patients with this complaint who were carefully examined, loss or marked diminution of postural sensation was found in the fingers and wrists. A point of considerable interest was that vibratory sensation in these patients was intact.

In 11 cases in which late sensory examinations of the face were made from one to thirteen months after operation, there were a number of alterations. Whereas in the immediate postoperative period 7 of the 11 patients who were re-examined showed complete analgesia of the entire trigeminal field, late examination showed that 5 had analgesia in all three divisions. In 2 cases the analgesia had faded in the third and first divisions, respectively. In 1 case an original analgesia had almost entirely disappeared, leaving only a small patch of hypalgesia beneath the mouth. In another case a profound degree of sensory loss in all three divisions of the face had faded to only a mild hypalgesia in the first division.

Of the 6 patients with major trigeminal neuralgia on whom operation was performed, 4 when last seen from one to eight months after the operation had complete relief from neuralgic pains. One patient complained of paroxysms of burning at the angle of the mouth, which were not distressing. However, because of the slight residual sensory loss in her face, it is possible that her neuralgia may return. One

patient, the only patient with trigeminal neuralgia in whose case the authors' treatment failed, had a return of severe neuralgia in the second division after relief lasting eleven months.

Of the 9 patients with malignant disease on whom tractotomy was performed and on whom the authors have follow-up data relating to relief of pain, 5 had complete relief from one to thirteen months after the operation. Two patients had marked though incomplete relief. This was probably due to extension of their carcinoma to other regions of the head, outside the distribution of the sectioned trigeminal tract. Another patient still had a mild degree of pain at the time of his death, one month after operation. This patient had from the time of operation an inadequate sensory loss. Another patient, in whom there was apparently no sensory loss produced by the operation, continued to have unabated pain.

In 9 of 13 cases in which data are available there were varying degrees of neurological disturbance at intervals of from one to thirteen months after the operation. In 4 instances these disturbances were minor. They consisted of occasional lurching, some difficulty in walking on stairs, slight veering of the gait to the homolateral side, a little clumsiness with the homolateral leg in walking, or a little difficulty in performing complicated tasks, such as type-writing. In 5 cases, however, the disturbances were more severe. There were 2 such cases among those in which operation was done for trigeminal neuralgia. One patient required the use of a cane to venture out on the street, although he was able to get around his house easily. He stood with feet apart and tended to stagger to the homolateral side, and his trunk was inclined to the side operated on. After another eleven months following the operation he was unable to walk without support. This patient, however, had symptomatic trigeminal neuralgia engrafted on multiple sclerosis. Although he had had marked ataxia of both legs before operation, and it was therefore difficult to appraise the effect of the operation on the neurological picture, the fact remains that he was more ataxic after operation than before. Three patients operated on for malignant disease had marked neurological disturbances. Two were unable to walk without support and had marked in-co-ordination in the homolateral extremities at the time of their deaths, one and two months, respectively, after operation. One was able to walk unsupported eight months after operation but staggered considerably. He stood with feet apart and his trunk inclined to the homolateral side. He also had hemihypalgesia of the opposite side of his body, this was the only instance in this series in which there was a Wallenberg syndrome produced by the operation. Four patients were entirely free of neurological disturbances six and one-half, five and one-half, three, and thirteen months, respectively, after operation.

The neurological sequelae of tractotomy as described here might seem to preclude its use. However, the suggested shift in the position of the incision into the medulla has enabled the authors to re-

lieve the pain in the last 3 cases of trigeminal neuralgia with few and minor resulting disabilities. If further experience indicates that the asynergic and dy metric complications can be reduced to this extent a definite place exists for this procedure.

Not infrequently patients are encountered who complain of a burning sensation in the face between the paroxysms of major neuralgia. According to the authors frequently after relief of pain by root section this burning sensation continues as a dyesthesia in the anesthetic area. For such patients tractotomy may be particularly indicated because the absence of subjective sensory change in the face following this procedure as compared to the total anesthesia accompanying root section may go far to prevent aggravation of the burning dyesthesia. This persistent dyesthesia is a very distressing sequela to root section.

If a patient has trigeminal neuralgia in all three divisions tractotomy should be considered because the corneal reflex is spared and keratitis avoided. In the rare instances in which the neuralgia has recurred on the opposite side of the face the initial pain having been cured by complete sensory and motor root section the recurring pain can be relieved by tractotomy without any possibility of damage to the remaining motor root. When a cancer of the mouth of the base of the tongue or of the mandible is present and requires a suboccipital craniotomy for section of the fifth ninth and posterior cervical roots for relief of pain tractotomy is easier to perform than transection of the trigeminal root at the pons.

Under these limited conditions therefore a very real place for medullary tractotomy may be found in the treatment of trigeminal neuralgia. Because of the potential neurological sequelæ following a badly placed incision into the medulla this procedure will never be used routinely even by those experienced with it. However every neurosurgeon dealing with many patients with trigeminal neuralgia should

know how to perform this maneuver whenever the proper indication for its use exists.

DAVID J. IMPASTATO, M.D.

MISCELLANEOUS

Russell H. Observations on the Classification of the Gliomas. *Ed. b. g. M. J. 94 43 145*

The examination of a collection of slides of 300 gliomas brought into relief the value of the old subdivision of these tumors into glioma and gliosarcoma terms for which gliocytoma and glioblastoma may be substituted today.

The gliocytomas are tumors containing relatively mature glia elements such as astrocytes and oligodendrocytes.

The glioblastomas contain immature glia cells ranging from undifferentiated forms such as are seen in the wall of the neural tube in the early embryo to astroblasts. It is suggested that there is no true subdivision of the glioblastomas and that the variety of cell shapes found in them is merely evidence of some degree of differentiation within a tumor which arises in a tissue possessing great potentiality for differentiation. The term glioblastoma is adequate to describe all the variations which appear but it does not exclude the use of qualifying adjectives such as isomorphic heteromorphic and astroblastic to indicate dominant or conspicuous cell elements.

The neuroblastomas of the eye and brain which appear to be so closely allied to the isomorphic glioblastomas have been classed here as a separate group. Eventually they have to be studied in relation to the neuroblastomas of the sympathetic system and that is beyond the scope of this study.

It is suggested that if the terms glioma epithelioma or neuro epithelioma are to be retained they should be applied to ependymal and choroidal tumors which show the fundamental pattern of a tissue in which the cell appears to form the lining of a surface.

SAMUEL H. KLEIN, M.D.

SURGERY OF THE THORAX

CHEST WALL AND BREAST

Parsons, W H , and McCall, E F The Role of Estrogenic Substances in the Production of Malignant Mammary Lesions *Surgery*, 1941, 9 780

Evidence increasingly tends to accentuate reported experimental work on the carcinogenic activity of the estrogens as regards their role in the production of malignant mammary lesions. Many able investigators have been able to produce, employing strains of mice capable of developing spontaneous mammary carcinoma, malignant neoplasms of the breast in male mice by continued estrogenic therapy. It has been possible also to reduce the age level at which such strains would ordinarily develop adenocarcinoma of the breast. Other investigators have produced malignant lesions of the breast in rats possessed of no hereditary tendency toward the development of spontaneous cancer. Still others have shown that human beings under prolonged estrogen therapy undergo definite breast and genital changes, which may eventually lead to the development of malignant lesions.

At the present time it would seem unwise to draw definite conclusions regarding the actual production of malignant lesions in the human being as a result of prolonged or massive estrogen therapy. Before such a position would be tenable, more careful study will be necessary to evaluate the already accumulating case reports, but from the evidence now at hand it would seem that the indiscriminate use of the hormones is certainly not beneficial to the majority of the patients on whom they are used and may actually be harmful. Certainly, these hormones should be employed with judicious care.

Although definite proof of the role of the estrogens is lacking in the case of a white woman fifty-four years of age, which case was reported by the author, one would suspect at least that the estrogens may have played a very major etiological role in the development of the malignant mammary adenocarcinoma that was present. JOSEPH K. NARAT, M.D.

TRACHEA, LUNGS, AND PLEURA

Farberov, B E , and Baslow, E A Primary Tumors of the Lungs, Roentgen Diagnosis and Therapy *Am J Roentgenol*, 1941, 45 701

After briefly discussing the pathology, symptomatology, and diagnosis of primary tumors of the lungs, the authors present the findings in 130 such cases which came under their observation. Of this number 124 were carcinomas, 3 sarcomas, 2 fibromas, and 1 lymphangitis sarcomatosis. The cases are analyzed as to the symptoms suggesting the condition, methods used for its recognition, and the associated metastases.

The following roentgenological signs were considered of importance: a dense solitary shadow on one side of the chest, displacement of the organs of the mediastinum during inspiration, rise of the diaphragm on the side of the lesion, paradoxical movement of the diaphragm, and metastases in the bones, lymph nodes, and other organs. Attention is called to errors made in connection with the roentgenological diagnosis. Individual cases are cited in detail to illustrate the difficulty of arrival at correct conclusions in some instances. The value of sputum examinations is stressed. Complications such as atelectasis, pleural effusions, and necrosis are given consideration.

The different types of carcinoma of the lung are discussed at length in regard to the roentgen findings associated with them. The helps which bronchoscopy, bronchography, kymography, and serial examinations can give are all mentioned. As to the differential diagnosis, actinomycosis, chronic pneumonia, lues, lymphogranulomatosis, tuberculosis, pneumoconiosis, abscess or gangrene of the lung, and interlobar empyema are among the conditions which may produce similar findings.

As regards roentgen therapy in primary carcinoma of the lung, the authors' experience is practically the same as that reported by others. Palliation rather than cure is the most irradiation can offer. In 44 proved cases thus treated, the average period of survival after diagnosis was about eight months, whereas 21 untreated patients of the same group survived only five and a half months. The influence of roentgen therapy on the clinical symptoms is beneficial. In many cases the dyspnea diminishes, pain disappears or diminishes, and sometimes even the cough disappears and the temperature becomes normal. The general condition of the patients is often improved, they gain weight and even return to work. However, there are cases in which roentgen therapy produces no results and the symptoms are even aggravated. In some cases there is regression of the pathological process. Although the results obtained to date are mainly palliative, the authors believe this method of treatment should be used.

ADOLPH HARTUNG, M.D.

Gebauer, P W The Differentiation of Bronchiogenic Carcinomas *J Thoracic Surg*, 1941, 10 373

The author has correlated the clinical, roentgenological, and bronchoscopic features of the three types of bronchiogenic carcinomas in this paper.

The small-cell carcinoma most frequently arises in the main stem bronchus, less frequently near the orifice of a secondary branch, and rarely in a small branch bronchus. It forms an irregular mediastinal mass, is highly invasive, extends along the bronchus, and metastasizes early to adjacent, regional, and distant lymph nodes. Early symptoms are cough

and vague thoracic sensations. Hemoptysis hoarseness dyspnea wheezing and dysphagia are late symptoms. The average age of the patients is forty seven years.

Röntgenologically an irregular mass is seen early. It blends with the mediastinum and does not have a sharp outline. Surrounding inflammatory infiltration is scanty but may be extensive. Atelectasis is not common. Invasion and distortion of the mediastinum is more likely to be seen.

Bronchoscopically extreme distortion and fixation of bronchus is seen. Late in the disease the tracheobronchial tree is fixed, the trachea compressed, the carina widened and the main bronchus compressed.

Surgically there is little hope that many cases may be cured by excision.

Adenocarcinomas arise in secondary bronchi in 70 per cent of the cases, in small bronchi in 20 per cent and in the main bronchi in 10 per cent. They extend peripherally as well as centrally. They frequently form a well circumscribed mass which appears as a nodule in the lung. Lymphatic metastasis is extensive and blood borne metastases are frequent. Pleural effusion is common. Hemoptysis and pleural pain are early symptoms. The average age of the patients was fifty one years and the average duration of life eight months after onset of notable symptoms.

The early roentgenogram frequently displays a sharply circumscribed dense mass separate from the mediastinum and there is usually no evidence of mediastinal involvement. Late in the disease it resembles other types except that it frequently produces secondary nodules.

Bronchoscopy may be entirely negative despite a fairly sized tumor. If the tumor has perforated the bronchus a positive biopsy will be obtained. Late in the disease there will be fixation and distortion of the tracheobronchial tree.

Surgically these tumors are most favorable for excision particularly if located in the periphery of the lung.

Squamous-cell carcinoma originates in the first branches of the main stem bronchus in 70 per cent of the cases. The average age of the patients was fifty five years and the average duration of life twelve months. The tumor grows more slowly and metastasizes more slowly and less extensively than the other two types described. It frequently shows cavitation. The earliest symptom is usually a productive cough with blood streaked sputum. The onset is insidious. Infection produces fever, cough and weight loss.

Röntgenologically in early case a nodule is seen in the lung, it is not entirely peripheral and is less sharply circumscribed than the adenocarcinoma. Surrounding inflammatory infiltration is common. Occlusion of a secondary bronchus with lobar atelectasis, necrosis and cavitation is frequently seen.

Bronchoscopically a positive biopsy may be obtained in early cases except when the upper lobe

bronchi are involved. The tumor is usually an ulcerous stenotic lesion with its site of origin deep in the bronchus and a conical contraction above it. When infection supervenes the bronchus appears contracted, angry, red and stenotic.

Surgically this is the type best suited for surgical removal. The slow growth, deep origin in the bronchi and late metastasis allow a better chance for complete excision and cure.

Gebauer has pointed out that symptoms of cancer of the lung occur early. Bronchoscopy will lead to a positive diagnosis only in from 40 to 50 per cent of the early cases and roentgenograms, bronchograms, aspiration biopsy and even exploratory thoracotomy must be resorted to early in the course of the disease if the diagnosis is to be made while the carcinoma is still a local disease. Removal of the whole lung is the only known cure for cancer of the lung.

JULIAN A. MOORE, M.D.

Weinberg, L. I. Peripneumonia. *Ann. Surg.* 47: 253.

Peripneumonia or parapneumonia is a suppurative inflammation of cellular tissue located between the costal pleura and intrathoracic fascia on one side and the chest wall on the other side. The course of the process is either subacute or chronic. The first type being caused by pyogenic bacteria and the second mostly by tuberculous. Any portion of the chest wall may be affected and the process may occupy one or a few intercostal spaces or even the entire half of the thorax. In one of the author's cases the abscess contained air apparently deriving from a perforated cortical pulmonary abscess.

The first symptom of peripneumonia is usually pain in a circumcribed portion of the chest aggravated by movement of the body during inspiration and cough. The tumefaction gradually increases in size and a fluctuation may appear. The overlying skin either retains its normal color or an erythema develops. If the underlying lung and pleural cavity remain intact the findings on percussion and auscultation of the surrounding regions remain normal while a dullness and feeble respiratory sounds are found over the tumefaction and the vocal fremitus diminished.

The amount of pus may range from a few tenths as far as 60 cc. The pus spreads through the lymphatic path in a lateral direction toward the outside but not inward. Apparently a primary pleuritis originates in deeply seated lymph glands of the thoracic wall. In some instances the infection may involve the peripneumoniae by continuity or contiguity from adjoining regions especially from the lung.

The differential diagnosis between peripneumonia and circumscribed empyema of the chest must be based on the following points:

A widened intercostal space points to peripneumonia.

2. A sigmoidal configuration characteristic of empyema of the chest while multiple spontaneous perforations

and the formation of fistulas are sometimes found in peripleuritis

3 The pus from an empyema cavity is thinner and has a lower specific gravity than that of peripleuritis

4 The lower border of empyema is always formed by the lower limits of the pleura while a peripleuritic abscess may be located higher

5 The upper border of dullness over empyema frequently runs in a horizontal direction across the entire width of the involved side of the chest, which is not the case in peripleuritis

Peripleuritis cannot be differentiated clinically from osteomyelitis of the ribs and only roentgenograms can establish the correct diagnosis. During inspiration the abscess caused by peripleuritis becomes flattened while on expiration its size and tension increase

The treatment of peripleuritis consists of an incision, supplemented if necessary by a rib resection. Both cases observed by the author had a fatal outcome

JOSEPH K. NARAT, M.D.

ESOPHAGUS AND MEDIASTINUM

Ochsner, A., and DeBakey, M. Surgical Aspects of Carcinoma of the Esophagus, a Review of the Literature and Report of 4 Cases. *J. Thoracic Surg.*, 1941, 10: 401

The authors have presented a complete review of the history of the experimental and clinical work done on carcinoma of the esophagus. They have reviewed particularly the development of the surgical technique employed in removing the esophagus.

In their opinion only two types of surgical procedures should be considered, namely, the thoraco-abdominal and thoraco-cervical operations.

In all the world's literature there have been reported 195 cases, including the authors' cases, in which resection of the esophagus was done. One hundred and forty patients died as a result of the operation, an operative mortality rate of 71.8 per cent. The percentage of five-year cures is not given.

Four cases are reported by the authors, 3 of their patients died and 1 is living eighteen months after operation.

JULIAN A. MOORE, M.D.

SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

O Leary C M and Clymer C E Umbilical Hernia *Am J Surg* 194 51 38

In a survey of 80 000 admissions at the University Hospital in Oklahoma City 62 umbilical hernias were encountered Of these 7 were congenital 22 infantile and 33 of the adult type An additional 84 cases from the literature are reviewed

One case of congenital umbilical hernia may be found in every 5 000 deliveries Most of the cases reported were of embryonic origin while a few were probably of fetal origin Other congenital defects were present in about one third of the cases Careful inspection of the cord will preclude ligation of a loop of intestine in the hernial sac The hernial wall is composed of two avascular layers separated by Wharton's jelly and the sac may be occupied by several organs Although in most instances the diameter of the neck of the sac is less than 5 cm many patients present a large defect The hernial defect must be closed early preferably within the first six hours Delayed surgery resection of the bowel or incomplete closure of the defect usually results in mortality The sac structures are removed the hernial contents are reduced and the wound is closed in layers by means of an intra-peritoneal operation No other surgery should be attempted if it can be avoided

Umbilical hernias of the infantile type are usually noted during the first or second month of life Although other evidences of maldevelopment are infrequent about 30 per cent of these infants will have bilateral inguinal hernias as well Truss support should be instituted If a cure does not result operation is justified but not before the child is five years of age The technique of repair consists of eradication of the sac apposition of the recti muscles and transverse overlapping of the fascia

The adult type of umbilical hernia usually begins between the ages of twenty and thirty Obesity and multiple pregnancies are important etiological factors The defect is usually small and is situated at the point of the obliterated umbilical vein in the umbilical cicatrix The hernial coverings consist of peritoneum transversalis fascia and skin About 1 of every 8 umbilical hernia will strangulate which raises the mortality from 1 to 3 per cent for simple umbilical hernia to between 30 and 50 per cent for cases with strangulation

Adequate weight reduction and the use of abdominal binders in voluminous hernias for a period of time is advisable pre-operatively Transverse overlap of the fascia is conceded to be the best type of repair after the contents of the sac have been returned to the abdominal cavity and the peritoneum has been closed Postoperative abdominal distention is treated by continuous gastric suction

by means of the Levine nasal tube The patient must remain in bed for at least three weeks wear an elastic belt for a year or longer and avoid undue weight gain This method is followed by a recurrence rate of about 10 per cent

S LIBBY TRITELMA M D

GASTRO INTESTINAL TRACT

Lol L Chang s In Gastric Adhity Caus d by Cholecyst gastrostomy and Cholecystoduodenostomy for Calculi of the Bile Tract (Sulle modificazioni dell'acidità gastrica da tre mesi da 11 c leucostom e dalla colecistoduodenostomia per c l'olosa delle bilari) *Idol R me* 94 48 ex chr 57

The author discusses the previous experimental and clinical work on gastric acidity and then reports 20 cases of his own In 16 of these cholecystogastrotomy was performed for calculi of the bile tract and in 4 cholecystoduodenostomy was done He gives tables showing the detail of the findings at various periods after operation

Following the cholecystogastrotomies there was a tendency toward an increase of free hydrochloric acid and of total acidity in the stomach compared with the pre-operative findings Such an increase was seen in 12 of the 16 cases No definite conclusions are given in the cases of cholecystoduodenostomy because of the small number of cases

These increased acid values are of special significance because patients with gallstones are as a rule anacid or hypacid It may be assumed that the improved conditions of stomach secretion are brought about chiefly by retrogression of the gastritis and the anatomical and functional lesions of the liver which are found so frequently in patients with gallstone This is accomplished by the internal derivation of the bile brought about by the jejunation

AUDREY G MORAN M D

Soena E A Clinical Contribution to the Study of Phlegmonous Gastritis (Contributo alla storia della gastrite flemmiosa) *Pol i Rome* 94 43 ex hi 1 9

Phlegmonous gastritis is rare and little known despite the numerous works published on the subject during the past twenty years It is an extremely grave disease which is usually characterized by a sudden dramatic beginning with violent epigastric and hypogastric pain nausea and repeated vomiting followed by signs of circumscribed or diffuse peritonitis intense general symptoms and high fever The disease presents no characteristic signs which allow making or suspecting the correct diagnosis the literature reveals that the absence of clinical diagnosis is the rule in these cases Sovena describes the case of a habitual drinker aged twenty nine years

in whom the diagnosis of acute peritonitis due to perforation of gastric or duodenal ulcer was made. At operation, he found an acute phlegmonous gastritis which was limited to the antropylopic region and which he resected with good results.

The disease may occur at any age but is found especially between the ages of twenty and sixty years, it involves men three times out of four and its predisposing causes are supposed to be previous chronic gastritis, especially alcoholism, and possibly the ingestion of certain drugs, such as potassium iodide, oxalic acid, or turpentine. Phlegmonous gastritis may be primary, secondary, or metastatic, its usual bacterial agent is the streptococcus, and infection may take place through the blood stream or by direct inoculation of the mucosa from a traumatic, chemical, or thermal lesion, or the solution of continuity due to a pre-existing ulcer or cancer. The disease has been reproduced experimentally by the combination of three factors: the notable decrease of the gastric acidity obtained by roentgen irradiation, a traumatic lesion, and the massive introduction of virulent streptococci by mouth.

The primary seat of the inflammatory changes is the submucosa in which the pus is formed, the result is marked thickening of the gastric wall. The submucosa may become a vast abscess and the other layers of the gastric wall may be more or less altered by the inflammatory process, the mucosa is usually respected, but may be the seat of hemorrhages, edema, erosions, necrosis, and fibrinous stratifications, or punctiform perforations may occur through which the pus empties into the stomach. The muscular layer may be infiltrated and subsequently destroyed, the subserosa and the serosa may become involved with resulting peritonitis. In the circumscribed form, usually in the antropylopic region, the gastric wall may be enormously thickened, and show a striking difference between the phlegmonous and the healthy part. At times, the circumscribed form involves the fundus or the cardia.

Clinically, a distinction must be made between the acute and the subacute form, the latter having a less violent course. The acute form starts suddenly with grave symptoms from the beginning (atrocious colicky pains, nausea, hiccup, vomiting, high fever, and at times chills) and runs an impressive course. The general symptoms appear rapidly and blood examination reveals a leucocytosis of from 20,000 to 30,000. In short, on the first day the functional signs are gastric, the physical signs are epigastric, and the general signs are already grave, on the second day there are no more signs of intramural infection, but diffuse signs of spreading infection and of generalized peritonitis for which it is difficult to find a starting point and a supramesocolic maximum (Mondor). Death occurs from four to six days after the beginning of the symptoms.

The treatment is surgical: an exploratory laparotomy must always be performed unless the patient's condition is hopeless. When the acute phlegmonous gastritis is diffuse, gastric resection is technically

impossible and simple tamponing of the peritoneal cavity around the infiltrated gastric wall is indicated, eventually associated with gastrotomy to drain the submucosal space but with care not to cut the mucosa, or the entire stomach may be covered with the omentum and the gastric recess may then be drained. In case of acute suppurating diffuse peritonitis, suprapubic drainage is advisable. In acute phlegmonous gastritis of antropylopic localization, without peritonitis or with beginning and circumscribed peritoneal lesions, in young patients who are in good general condition, resection and gastrojejunal anastomosis in healthy tissue are indicated. If there is diffuse peritonitis, ample drainage of the gastric recess and tamponing of the infiltrated gastric wall are recommended, eventually, gastrotomy to drain the submucosal space, jejunostomy in case of pyloric stenosis, and suprapubic drainage if necessary are indicated. If the circumscribed phlegmon is localized in the fundus and the cardia, tamponing of the involved gastric portion and jejunostomy are the only solution. In circumscribed abscess of the gastric wall in which the local and general conditions do not allow resection, the abscess is opened from the outside and drained. Energetic medical treatment must be instituted from the beginning. In subacute cases, resection is indicated in the circumscribed forms and abstinence in the diffuse forms.

The global mortality of the disease reaches 92 per cent according to Sundberg, while the statistics of Gerster on operative cases up to 1927 shows 46 deaths and 13 recoveries. The author has found in the literature from 1927 until now 36 operative cases with 20 deaths and 16 recoveries.

RICHARD KEMEL, M D

Reid, M. R. The Use of Clinical Material for the Investigation of Gastric Cancer. *J. Nat. Cancer Inst.*, 1941, 1: 523.

The author points out and discusses the fact that only in recent years has the medical profession begun to realize that the study of human material may approach in accuracy and controlled conditions the study of laboratory animals in the investigation of many problems. He shows that human material is especially valuable in the study of cancer.

The Gastric-Cancer Clinic at the University of Cincinnati was established in 1936 for the special study of human material as regards gastric cancer and other conditions with a possible etiological bearing upon gastric cancer, i. e., peptic ulcer, atrophic gastritis, achlorhydria, and pernicious anemia. The personnel and equipment have gradually been organized and expanded so that now every patient admitted to the Clinic receives a full and thorough laboratory, x-ray, and gastroscopic examination by specially trained men in each field.

A method of pathological examination is described whereby large microscopic sections of the entire stomach are made and carefully studied as surgical and autopsy specimens of gastric disease, both cancerous and possibly precancerous. A technique of

fixing the stomach with formalin immediately after death is described

Special attention is paid to dietary habits. The nutritional state of the gastric cancer patient is assayed and if possible corrected before the apyctic measures are instituted especially surgery

The supplementary value of both gastroscopic and x-ray studies is emphasized by citation of cases in which a diagnosis was missed by either one or the other and of 3 cases in which it was missed by both. Two case reports supporting this idea are given in detail

It is pointed out that no single laboratory test is infallible and that all such tests should be evaluated for what they are worth and no more. They have far greater positive than negative value. No good clinician will be swayed by them if they go contrary to his clinical judgment. EARL GARSIDE, M.D.

Collins S. D., Goer M. and Dorn H. F. The Trend and Geographic Variation in Cancer Mortality and Prevalence with Special Reference to Gastric Cancer. *J. Nat. Cancer Inst.* 1944 45

This paper summarizes briefly and in graphic form the results of certain statistical studies of cancer with special reference to gastric cancer. These studies by the United States Public Health Service pertain to (1) the trend of cancer mortality (a) since 1900 in the ten States and the District of Columbia for which records are available and (b) since 1920 in different geographic areas (2) the variation from State to State in cancer mortality from 1930 to 32 and (3) the prevalence of cancer cases under treatment in twelve urban areas classified into three geographic regions

The recorded mortality from all cancer has increased steadily since 1900. The cancer death rate among males has increased more rapidly than that among females. In 1935 the male rate was 87 per cent of the female rate as compared with 59 per cent in 1900.

The recorded death rate from cancer of the stomach and liver among females increased from 1900 to about 1920 but decreased after that time. This decrease has affected chiefly persons under sixty-five years of age among females above seventy-five years of age the death rate has definitely increased. Among males the recorded death rate from cancer of the stomach and liver increased until about 1922 but there has been a slight decrease since that time. This decrease has affected chiefly the age groups under forty-five years among males above fifty-five years the death rate has definitely increased.

The decreases since about 1922 in mortality from cancer of the stomach and liver among males and females occurred in each geographic region except the South where there has been no decrease for males and only a slight decrease for females.

The highest recorded death rates from cancer of the stomach and duodenum from 1930 to 32 occurred in the northern states from the Atlantic to the

Pacific. In the southern states the rates are uniformly low, Louisiana being the only one that does not fall among the eleven lowest states. The other sites of cancer of the digestive system also show high death rates in the north although in some sites they do not show so much higher rates in the northwestern states as in the case in gastric cancer.

At the other extreme is skin cancer for which all of the southern states have the highest mortality rates. The mortality rate from cancer of the buccal cavity except of the lip and jaw is likewise relatively high among females in all of the southern states but among males there is no great contrast between the North and the South.

With regard to all cancer, resident cases under treatment per 100,000 of the white population in the surveyed areas amounted to 282 in the North, 386 in the South and 425 in the West. This showing is in contrast to the death rates of 124 per 100,000 of the surveyed population in the North, 97 in the South and 157 in the West. Thus the South shows a lower cancer death rate but a higher rate of cancer under treatment than the North. JOSEPH K. NARAY, M.D.

Griewold R. A. and Antonio R. F. Perforated Peptic Ulcer. *J. N. S. L.* 1942 39

One hundred and eleven consecutive cases of perforated peptic ulcer observed at the Louisville City Hospital from 1931 to 1940 are analyzed in this report. The authors have studied their cases critically and now submit the present surgical procedure which they have evolved from their own experience and from a study of the literature.

The procedure today consists of the following:

1. A short transverse incision under novocaine block anesthesia supplemented when necessary by a small amount of cyclopropane.

2. Thorough removal of intraperitoneal fluid including that in the pelvis by suction rather than with sponges.

3. Simple closure of the ulcer with two layers of interrupted silk sutures from the proximal to the distal side so as not to encroach upon the lumen of the pylorus. This suture line is reinforced by catching omentum in the outer layer of sutures.

4. From 5 to 6 gm. of sulfanilamide crystals are sprinkled about the lesion and from 3 to 5 gm. are implanted in the abdominal wall.

5. No intraperitoneal drains are used.

6. The abdominal wall is closed in layers with silk without drainage and a non-constricting dressing is applied.

7. A Levin tube is passed into the stomach just before or after operation and left there for from twenty-four to forty-eight hours. If ileus or peritonitis supervene the use of the tube is continued.

8. If the peritoneal culture shows the streptococcus sulfanilamide is pushed by any available route.

9. Pulmonary complications are combated by such measures as frequent turning of the patient.

and carbon-dioxide inhalations, bronchoscopic aspiration is indicated if atelectasis occurs

10 The salt and fluid balance are carefully controlled

11 Transfusions of blood or plasma are administered freely when indicated

One hundred and two patients were operated upon. There were 20 deaths, 10 of which were secondary to peritonitis. The peritoneal fluid was cultured in 65 cases. In 34 cases, no growth was found. The streptococcus or a streptococcal mixture was reported 18 times, in this group there were 8 deaths.

The final conclusion was that aside from the age of the patient and delay in operation, the most important factor in the mortality is the presence of the streptococcus in the peritoneal cavity. Next in importance are pulmonary complications.

SAMUEL J. FOGELSON, M.D.

Segelman, S. Y. Simple Ulcers of the Small Intestine. *Nov khir arkh*, 1940, 48: 45

Simple ulcers of the small intestine are characterized by their non-specific character, complete absence or minimal signs of inflammatory processes in the vicinity, obscure etiology, and presence of the common bacterial intestinal flora. This definition excludes syphilitic, tuberculous, typhoid, dysenteric, and actinomycotic ulcers as well as those of a traumatic origin (from pressure by fecal masses, distention of the intestines, or perforation by parasites), or of a toxic nature (from uremia and various poisonings). Some authors include in the group of simple ulcers the so-called peptic ulcers which are analogous to similar formations in the stomach.

Simple ulcers of the small intestine are rare. The author describes 3 cases, all of them in men from thirty-one to forty-one years of age.

The ulcers occur chiefly in the male sex. Marked clinical symptoms appear only after perforation or some other complication and therefore the lesions remain unrecognized for a long time. Sudden pain suggests a perforation, and the absence of typical gastric ulcer points to an involvement of the intestinal tract. Pain localized in the lower abdomen suggests a perforation of the intestines and not of the stomach.

JOSEPH K. NARAT, M.D.

Horsley, J. S. Resection of the Duodenum for Tumor of the Ampulla of Vater. *Ann Surg*, 1941, 113: 802

To a short review of the history of surgery for tumor of the ampulla of Vater and head of the pancreas, Horsley adds a report of a case operated upon by him.

While Coffey pioneered in the experimental work, it was not till 1922, that Mann and Kawamura developed a technique for excision of the duodenum and transplantation of the common and pancreatic ducts in one stage. The operation of Whipple, Parsons, and Mullins was based on physiological data. Originally it was undertaken in two stages

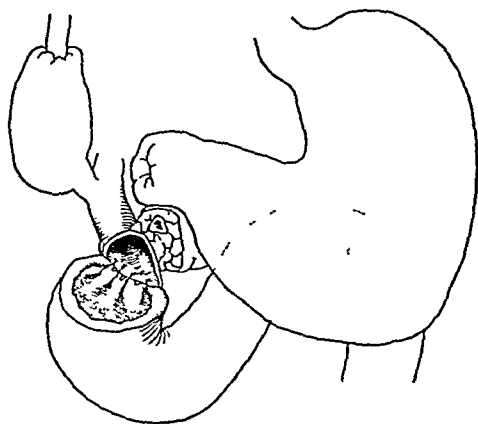


Fig. 1. In the operation performed in the reported case, the distal stump of the duodenum was sutured to the greatly enlarged common duct. The undilated pancreatic duct is shown in the stump of the pancreas near the common bile duct. (Courtesy of J. B. Lippincott Co.)

during the first of which the gall bladder was anastomosed to the stomach and a gastro-enterostomy was performed, and at a later stage excision of the duodenum and head of the pancreas, and ligation of the pancreatic duct were done. Since then, Whipple has modified the procedure by uniting the gall bladder to the jejunum, instead of the stomach, and again improved on the technique by uniting the common duct to the jejunum, so as to obviate the danger of a troublesome leak in the ligated stump of the common duct.

Horsley's patient was sixty years old and presented deep jaundice of seven weeks' duration. At operation the gall bladder contained white bile, no stones were found, but the duodenum was contracted and presented a small mass in the region of the ampulla of Vater. It appeared resectable, but since the infiltration extended into the pancreas, it was decided to resect a segment of duodenum including the ampulla, and the head of the pancreas. After closure of the proximal duodenal stump, the dilated common duct was sutured end-to-end to the posterior wall of the distal duodenal stump, the anterior wall was then closed about the free edge of the common duct stump and the proximal surface of the resected pancreas. Precaution against leakage was exercised by the use of omental grafts and a posterior gastro-enterostomy was done. A rubber tube was introduced into the gall bladder which had been opened for exploration during the early part of the operation.

The author's patient died on the fifth postoperative day. However, the operation in the case reported was in effect an attempt to preserve the external secretion of the pancreas, inasmuch as Horsley believes that cases not requiring extensive resection of the pancreas might lend themselves to this procedure.

ANTHONY F. SAVA, M.D.

Hunt E L and Kaneh G D Primary Adenocarcinoma of the Jejunum *New Eng J Med* 194 224 353

The authors report 3 cases of primary adenocarcinoma of the jejunum in which the lesion was resected and the bowel continuity restored by end-to-end anastomosis with no operative mortality. Two of the patients are now alive twelve and seven and one half years after the operation. The third patient died from bone metastases two years and four months after operation.

Although this lesion is relatively rare it should always be considered as a possibility when one is confronted with a gastrointestinal problem because early diagnosis and adequate treatment yield favorable results.

There are no pathognomonic symptoms of the disease. The first manifestations may be only weakness and fatigue. Intermittent cramps in the region of the umbilicus associated with borborygmi are frequent. Considerable time may elapse between eating and the onset of these cramps. Other symptoms of a lesion in the intestinal tract may be present namely anorexia, constipation, occult blood in the stool, vomiting, weight loss and secondary anemia. Physical examination generally reveals abdominal distention and visible peristalsis accompanied by cramps and borborygmi. A palpable freely movable tumor mass when present is significant. X-ray studies may show delayed passage of barium and dilatation of the portion of small intestine which is proximal to the lesion. Simple films of the abdomen to elicit the presence of gas may reveal the typical stepladder pattern of obstruction.

The essential treatment of adenocarcinoma of the jejunum is wide resection and re-establishment of intestinal continuity by some form of anastomosis. The operative procedure should be supplemented by supportive measures to satisfy normal physiological requirements of blood and tissue fluids and by Miller Abbott or Wangenstein intubation methods of decompression. *Edw Edw W Gib S MD*

Black C F Appendicitis *Bell J Surg Obst & Gynec* 94 49 97

The mortality rate of appendectomy varies widely from 12 to less than 1 per cent. The lowest rates are usually in the reports of individual operators, the highest in the reports of groups. A part of the explanation for this variation is due to the following:

1. Delays in arriving at a diagnosis and in sending patients to the hospital.
2. Poor judgment in evaluating the resistance of the patient.
3. Inadequate preoperative preparation of the patient.
4. Poor technique.
5. Inadequate postoperative support.
6. Improper administration of anesthetics.
7. Multiple operations. In the 3148 cases studied in which the appendix was removed 689 other operations were done at the same time.

It is suggested that some surgical organization should appoint a special committee to study the whole question of appendicitis. A first step should be a standard classification of the diseases of the appendix in order that reports could be accurately compared. The committee should outline methods which would obviate the present inconstant results by formulating standardized procedures drawn from the methods, suggestions and experience of various hospitals and surgeons. *SAMUEL KAREN MD*

Hillman R W Oxyuriasis is of the Appendix. A Clinical Study of 31 Cases *Bosky H J Surg* 94 3 83

Though the infestation of man with oxyuriasis (vermicularis or pinworm) has long been recognized it is only recently that evidence has accumulated which while not demonstrating a specific pathological process has definitely shown the organism to be responsible for a clinical entity oxyuriasis appendicitis.

The incidence of oxyuriasis infestation of the intestinal tract has been variously reported from 11.35 to 57.3 per cent. Reports on incidence in the appendix vary from 0.0 to 48 per cent. The figures including both appendices acutely inflamed and normal appendices removed incidentally.

The author examined 1601 appendices over a four year period at The Brooklyn Hospital of which 1294 were suspected of harboring appendicitis and 307 were removed incidentally to other surgery. Thirty-one instances (2.39 per cent) of oxyuriasis were found in the former group and none in the latter though 2 cases in normal appendices have been found since completion of the series.

Sixty-one and three tenths per cent of the patients gave a definite history of recurrent abdominal symptoms over a period of eighteen months. All complained of abdominal pain and approximately half complained of nausea and vomiting. Upon admission only 19.4 per cent were acutely ill but in 90.3 per cent abdominal tenderness was present. Localized tenderness was present in only half of the cases. The average leucocyte count was 17,429 with an average normal percentage of polymorphonuclear cells.

Pathological examination revealed that except for the presence of the organism in the lumen (essential for diagnosis) there is no pathological picture characteristic of oxyuriasis of the appendix in fact there is usually an entire absence of inflammatory changes. Symptoms are conceivably produced by hyperirritable movements of the appendix attempting to rid itself of the parasite. It is also probable that chronic complications may be due to generalized infestation of the lower bowel though the more severe episodes may be caused by appendiceal involvement *per se*.

Thus it appears that oxyuriasis of the appendix occurs chiefly in girls of school age and adolescent patients presenting the usual picture give a history of recurrent attacks for one or two years complain of

mild abdominal pains with nausea and often vomiting for several days prior to admission, do not appear acutely ill, have normal temperature, moderate abdominal tenderness, and show a slightly elevated total white count

The considerable variation in the clinical picture makes positive differentiation from acute suppurative appendicitis impossible. EARL GARSIDE, M D

LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

Murakami, T, and Uchiyama, H Functions of the Extrahepatic Bile Ducts and Secretory Function of the Liver. Clinical Study on the Relation Between the Duodenal Movements and the Evacuation of Bile into the Duodenum During Fasting. Experimental Study of the Relation Between the Movements of the Duodenum and the Functions of the Biliary Tract During Fasting. *Arch Surg*, 1941, 42: 693, 703

The relation between the movements of the duodenum and the discharge of bile in man during fasting was studied by means of a duodenal tube made up of an outer tube used for inflating a balloon and an inner tube for drainage of the duodenal fluid. The movement of the duodenum is periodic with three regularly repeated phases,—active, tetanic, and resting,—or non-periodic with continuous change from the active to the tetanic phase. Bile out-flow was seen only during periods of duodenal activity, periodic when the duodenal movement was periodic, and irregular but almost continuous when the duodenal movement was continuous. To distinguish between periodic and non-periodic movements is difficult, both show changes due to numerous physiological factors so that it cannot be readily said which is normal. When, during fasting, no bile is observed in the duodenal drainage fluid despite continuous movement of the duodenum, it may be assumed that a pathological condition is present in the biliary tract. "Hypertonic dyskinesia" of the biliary tract is indicated unless a complete obstruction of the biliary tract is observed.

The second paper presents results obtained in fasting, unanesthetized, intubated dogs in an investigation of the evacuation of bile, the contraction of the gall bladder, the resistance of the sphincter of Oddi and the duodenal movements. Double intubation of the common duct was carried out without injury to the gall bladder and at the same time a duodenal fistula was made, or a small balloon was placed inside of the duodenum opposite the papilla of Vater. The investigations were carried out 16 times on 14 animals. A periodic relation between the duodenal movements and the evacuation of bile was seen in 8 cases, non-periodic types of activity were noted in 5 cases and there was no evacuation of bile despite continuous movement of the duodenum in 2 cases.

During the resting period of periodic duodenal movement the intracholedochal pressure showed a

continuous decrease of from 30 to 80 mm of water pressure, according to the relaxation of the gall bladder, and remained almost constant in each case. During the active phase the pressure became intermittent, with tonic or rhythmic rises corresponding to the spontaneous contractions of the gall bladder. At the peak of such rises (from 120 to 200 mm) bile flowed intermittently into the duodenum. The resistance at the distal end of the common duct during the resting phase of the duodenum was from 80 to 240 mm, and during the active period remained about the same except for waves of variation in pressure (from 120 to 270 mm). When the duodenal movements became vigorous and entered the tetanic phase resistance rose in the several high waves, reaching from 200 to 500 mm.

With the non-periodic types of duodenal movement intracholedochal pressure (when the gall bladder was relaxed) was in some cases from 60 to 80 mm of water. In these cases the rhythmic or tonic pressure waves rose at intervals of 10 to 20 minutes, reaching from 120 to 160 mm and lasting from several minutes to one-half hour. In other cases the pressure remained continuous. The resistance at the distal end of the common duct was from 80 to 150 mm, with occasional variations ranging from 120 to 300 mm.

With the abnormal types of activity, despite the almost continuous movements of the duodenum, there was no evacuation of bile. The intracholedochal pressure was irregular and extremely variable (from 200 to 300 mm), according to the incessant contractions of the gall bladder, while the resistance at the distal end of the common duct appeared over 320 mm with waves reaching 500 mm of water pressure.

WALTER H. NADLER, M D

Klusemann, E. Clinic on Atresia of the Biliary Tract (Zur Klinik der Gallengangsatresien). Düsseldorf. Dissertation, 1939.

This is a presentation which, following a dissertation on the normal and abnormal developments of the liver and biliary-tract systems and a discussion of the clinical, differential diagnostic, prognostic, and therapeutic features thereof, analyzes 2 personal cases in addition to cases from the literature.

In 2 nursing infants intense and increasing jaundice developed after three weeks with a progressive decline in the physical well-being. Death occurred after a short time. Clinically everything pointed to an obstruction of the bile passages, and autopsy confirmed the clinical diagnosis of congenital biliary-duct atresia. A connection between the duodenum and common duct could not be demonstrated grossly or microscopically.

The chief clinical symptoms are jaundice, the appearance of direct bilirubin in the blood, bilirubinuria, absence of urobilin, colorless duodenal chyme, and acholic stools. The affliction is practically hopeless but, therapeutically, operative reports determine a further course of action. A passage for bile must be

fashioned through the gall bladder or biliary-duct system to the stomach or intestine. At the same time in most cases there are advanced cirrhotic changes in the liver which prejudice an already doubtful operative risk. As an explanation of biliary tract atresia the persistence of epithelial cells on of the extrahepatic biliary ducts which is physiologically in the second fetal month is postulated. This is entirely in accord with clinical observations. An extensive biliaryography accompanies the original article.

(HISTORICAL CRITERIA) JOHN L. LINDQUIST, MD

Lord J. W. Jr. and Andrus W. DeW. Changes in the Liver Associated with Hyperthyroidism with a Study of Plasma Prothrombin Levels in the Immediate Postoperative Period. *Arch Surg* 1941; 64: 3.

Various reports concerning morphological damage to the liver and impairment of hepatic function that accompany hyperthyroidism are reviewed. Of 680 patients with hyperthyroidism who were subjected to some form of operation on the thyroid gland in the past eight years, 16 have died, 8 in typical thyroid crises. Necropsies were performed on 6 of these patients. All of the livers showed moderate to marked amounts of yellow mottling and microscopically the three outstanding observations were large droplets of fat diffusely distributed in the parenchymatous cells, central necrosis of the hepatic cords with marked infiltration of the necrotic area by polymorphonuclear leukocytes and red blood cells and a moderate to marked degree of connective tissue proliferation in the portal spaces with accumulation of lymphocytes.

The authors believe that the response of a lowered level of plasma prothrombin to intramuscular injection of 2 m. thymol naphthoquinone is a most sensitive measure of hepatic function. A series of 36 consecutive patients with hyperthyroidism and 34 controls were studied by means of the level of plasma prothrombin as determined by the Warburg-Brinkhouse and Smith test. Impairment of hepatic function according to this test was noted after operation in 9 of the 36 patients in the former group.

The influence of the carbohydrate-fat ratio of the diet and of the Vitamin B complex on the liver is discussed. The authors suggest that in the preoperative and postoperative treatment of the patient with hyperthyroidism a high caloric high carbohydrate high protein and low fat diet supplemented with liberal amounts of Vitamin B complex be used.

WILLIAM L. MD

Doehring P. C. Macroscopically Non Pathological Gall Bladder. A Clinicopathological Study. *Arch Surg* 1941; 64: 6.

A study of almost 2000 cases in which cholecystectomy was performed respectively of why it was performed revealed that in 11% of the cases stones were not found and that almost a third of these (57.5%) patients had shown no gross pathological lesions and could not be distinguished

grossly from normal. A macroscopically non pathological gall bladder may be found at operation even in the presence of a history typical of gall bladder disease with biliary colic jaundice and tenderness in the right upper abdominal quadrant. Half of the patients with apparently normal gall bladders gave a history typical of disease of the gall bladder a third of them had typical biliary colic and another third gave a history of jaundice. The author has considered the etiology of the explanation of these symptoms although no new evidence is offered. Half of the patients showed evidence of nervous exhaustion or neurotic tendencies. Almost 90% of the cholecystograms showed normally functioning gall bladders. There was no constant relation of the operative findings to any of the preoperative findings. No evidence was found to support the view that hepatitis as described at the time of operation is of any significance either in relation to the preoperative findings or to the prognosis.

Microscopically all specimens showed varying degrees of lymphocytic infiltration although there was no relation between the degree of infiltration and the preoperative findings operative findings or prognosis. The results of cholecystectomy in this study are similar to those found by others in similar cases and the good results are fewer than in those cases in which definite pathological lesions or stones were present. Fifty five percent of the patients were cured, 21 percent were benefited and 23 percent obtained no relief. The operative mortality was 1 percent. There is no way to predict either before or at operation which patients with macroscopically normal gall bladders will be relieved of their symptoms following cholecystectomy. Regardless of the way in which the case are grouped approximately 1 of 4 receive no benefit from cholecystectomy.

Fernicola C. and Ticoni F. Roentgenological Diagnosis of a Spontaneous Fistula Between the Gall Bladder and Duodenum Caused by Biliary Calculus (Fistulae spontanea coledocoduodenalis calculi biliaris). *Arch Surg* 1941; 64: 55.

The case of a man of thirty seven who for ten years had had symptoms of acute cholecystitis is described. These symptoms had been followed by the patient through his stomach symptoms. He was sent to the hospital on account of nausea and vomiting. A probable diagnosis of gall stones was suggested with stenotic ulcer of the pylorus was made. Cholecystography was negative. Serial roentgenogram of the stomach and duodenum demonstrated an irregular filling. If there was a rupture of the intestine opaque filling at 3 cm. to the right of the bulb of the duodenum with which it was connected by a distended duodenum. A partially filled with barium duodenum connected with the duodenum by a fistula. A supplementary examination was made to confirm this fact. The roentgenogram reproduced. Operation was

performed under spinal anesthesia, and recovery was uneventful.

In all cases of biliary ileus the existence of a fistula between the gall bladder and duodenum should be suspected and the proper measures taken. Diagnosis, which is difficult, must be based on signs of lithiasis followed by those of biliary ileus and a careful roentgen examination. A negative roentgen examination does not prove the absence of cholecystoduodenal fistula. The prognosis is serious and death may result if operation is not performed promptly.

AUDREY G. MORGAN, M.D.

Sjogren, S. E. A Diverticulum-Like Formation in the Choledochus, Demonstrated by Cholangiography (Divertikelähnliche Bildung am Choledochus, nachgewiesen durch Cholangiographie) *Acta radiol.* 1941, 22: 318.

Anomalies of the biliary tract are often observed, but usually offer little interest from the roentgenological point of view. Anomalies which consist of cystic formation in the biliary tract are rare and have hitherto been found nearly exclusively at operation or autopsy; they are seldom demonstrable with the usual roentgenological methods of examination, such as cholecystography and plain exposures. Lately, cholangiography during operation has been used with increasing frequency; it will provide a large amount of information about the malformations of the biliary tract, provided that all cases which deviate from the normal are faithfully reported in the roentgenological literature.

Sjogren describes the case of a woman, aged thirty-nine years, in whom cholecystectomy had

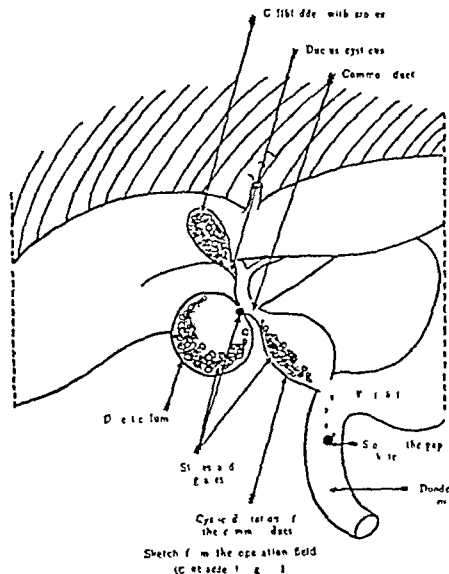


Fig. 2. Cystic dilatation of the common duct.

been performed because of gall stones five years previously, and recurrence of pains motivated an exploratory laparotomy one year later except for adhesions, nothing abnormal was found. The attacks of pain continued and had increased in frequency and intensity. During all this time, no icterus or discoloration of the urine or feces was observed. On admission, roentgen examination of the abdomen disclosed only a large duodenal diverticulum in the region of Vater's papilla. At operation, no pathological changes were discovered in the biliary tract by palpation, and no gall stones were found. The choledochus was incised and sounded and a large pocket was found on its posterior wall. Cholangiography showed that the hepatic duct and the choledochus were not enlarged but were filled with contrast substance which reached the duodenum and the duodenal diverticulum, part of the pancreatic duct was visible. At the posterior aspect of the choledochus and about 4 cm. above the papilla of Vater, there was an oval, cystic formation, about 4 cm. long and 3 cm. wide, connected with the choledochus at its lower pole. The connecting portion was decidedly narrower but its opening was rather wide (Fig. 1).

At a certain stage in the embryonic development of the biliary tract, the choledochus presents relatively often numerous epithelial nodules and diverticular formations; these structures are found especially in the region of the junction of the cystic duct with the choledochus and regress during further development. However, they offer embryonic possibilities for the origination of a diverticulum of the choledochus by persistence and subsequent development of one of these superfluous fetal forma-



Fig. 1. (1) Hepatic duct, (2) Choledochus, (3) Duodenum, (4) Duodenal diverticulum, (5) Pancreatic duct, and (6) Choledochus diverticulum.

tions To the knowledge of the author diverticulum of the choledochus formed after the fetal period has been described once by Budde who found a small diverticulum of the lowest part of the choledochus lying within the duodenal wall and once by Söderlund the latter's case (Fig. 2) corresponded exactly with the present one and these are the only 2 cases of diverticulum of the choledochus observed up to the present time in adults

These cases offer a theoretical interest for the etiology of another choledochus anomaly i.e. congenital idiopathic dilatation or the so-called choledochus cyst known in the Anglo-Saxon literature as diverticulum of the common bile duct This anomaly is also rare The 2 cases of diverticulum of the choledochus seem to contribute to filling the gap between fetal diverticular formations and congenital idiopathic dilatation of the choledochus

RICHARD KEMEL, M.D.

Franco S. G. Carcinoma of the Head of the Pancreas. A Review of 40 Cases. *Am J Digest Dis* 194 8 65

Carcinoma of the head of the pancreas often mimics other abdominal disease and is an obscure type of abdominal neoplasm In the author's series of 40 cases the diagnosis was established by autopsy biopsy or by the presence of abdominal metastases More than half of the patients were in the sixth decade of life The sex distribution was 23 males and 17 females There was a past history of gastric illness in 8 patients gall bladder disease in 4 recurrent indigestion in 3 and jaundice in 1 patient More than 15 per cent had had symptoms for a month or less on admission Fifteen patients had had symptoms of eight months duration The most common symptoms were abdominal pain jaundice severe weight loss and a change in bowel habit A few patients presented a painless jaundice If the absence of jaundice diagnosis was difficult because the x-rays often failed to reveal any localizing lesion Physical examination revealed fever in one half of the patients jaundice in 31 and an enlarged liver in 27 An enlarged gall bladder was present in 6 cases and a palpable epigastric mass other than the liver or gall bladder was found only five times

As in the case of obstructive jaundice urobilinogen was absent in the urine It may be present however in the event of severe liver damage and a case not included in this series is cited as an example Clinically the persistent absence of urobilinogen in the urine in the presence of icterus is a period of two weeks indicates obstructive jaundice With severe hepatitis due to other causes temporary obstruction of the bile canaliculi may cause urobilinogen to disappear from the urine but if the jaundice survives the urobilinogen reappears No study was made of pancreatic enzymes in this series In regard to other laboratory tests glycosuria was found in 3 cases and achlorhydria in 6 cases

In 10 of 26 patients subjected to gastro-intestinal ray study there were normal findings The ab-

normal x-ray findings in the remainder were principally located about the duodenum and pylorus

Operative treatment consisted usually of anastomosis of the gall bladder to the stomach or duodenum Gastro-enterostomy was also performed In addition in a number of patients because of the tendency toward duodenal obstruction by tumor growth

From the onset of symptoms to the death of the patient the average lapse of time was two and a half months This was shorter than in most series and the author believes it was due to the high incidence of operative intervention Earlier diagnosis with earlier exploration would allow a greater percentage of resections in an attempt to cure the disease

JOHN L. LINDQVIST, M.D.

Della Maggiore B. The Permanent Good Effect of Ligation of the Splenic Artery in an Ascitic Splenohepatic Syndrome (Effetti della ligatione dell'arteria splenica nell'ascite spleno-epatica) *Poll R med* 94: 48 sez. med. 56

A man of thirty-five years was admitted to the hospital with the abdomen enlarged from ascites He had enlargement of the liver and spleen of the congestive sclerotic type in the early ascitic stage with marked signs of impairment of liver function He was in poor general condition with remittent fever On the first examination of the blood there were 3,910,000 red cells and 4,300 leucocytes the color index was 0.80

The hemolytic action of splenic type the disturbed condition of the spleen and portal circulation and the cirrhotic action of the spleen on the liver were the factors which seemed to indicate ligation of the spleen in this case Ligation of the artery would decrease the action of the spleen without the dangers involved in splenectomy The reference is to the work of S. Perle

A table is given which shows the details with regard to the blood findings at various periods up to four years after the operation At the end of the four years the blood picture had returned to normal The patient was in good general condition The spleen and liver had decreased in size and the function of the latter was normal Therefore the ligation of the splenic artery seemed to have had a permanent good effect

ARON G. MOSE, M.D.

MISCELLANEOUS

Beck J. E. Rothschild N. S. and Dan J. G. Intra-Abdominal Apoplexy. *Ann Surg* 94 3 53

The author reports a case of massive intra-abdominal hemorrhage together with study of 10 cases collected from the literature

The patient was a man fifty-two years of age On admission to the hospital he complained of constant dull diffuse abdominal pain of three days duration associated with vomiting on one occasion

only There was no history of previous digestive trouble Hypertension had been present for several years

The blood pressure was 240/170 There were cardiac and arterial changes characteristic of hypertensive disease The abdomen was flat and relaxed Some epigastric tenderness was present A leucocytosis of 16,000 with 86 per cent neutrophils was present

Five days after admission to the hospital an elevation of the temperature to 103°(F), as well as abdominal distention without increased pain, was noted Thirteen days after admission the patient had sudden severe non-localized abdominal pain, vomiting, and partial collapse The blood pressure was 90/70, the abdomen was moderately distended but not tender No physical signs of intraperitoneal fluid could be demonstrated Audible peristalsis disappeared Operation was carried out after the patient had reacted to treatment for shock The presumptive diagnosis was mesenteric thrombosis

More than 1,000 cc of blood were removed from the peritoneal cavity Complete exploration failed

to reveal the site of hemorrhage and the abdomen was closed without drainage There was some post-operative shock, otherwise recovery was essentially uneventful except for abdominal distention, hydrothorax, and anasarca, presumably due to protein and vitamin deficiency

From their study, the authors conclude that this diagnosis should be considered in all cases in which there is sudden, severe abdominal pain, shock, and signs of peritoneal irritation, especially in the presence of known hypertension There is nothing pathognomonic about the signs or symptoms that would permit a definite pre-operative diagnosis This is well illustrated by the fact that in none of the collected cases was there a correct diagnosis made prior to operation It is probable that hypertension and arteriosclerosis are the dominant factors in the etiology of the condition The authors suggest the possibility of rupture of small aneurysmal dilatations as a cause in younger individuals Early operation and control of the bleeding point, if possible, is indicated If the bleeding point is found the chances for recovery are good

JOHN A GILS, M D

GYNECOLOGY

UTERUS

Bodemann W. Uterus Solidus (Uterus solidus)
 Je a Dissertation 1940

The author's report includes a general and a historical consideration of the development of the female genitalia and anomalous formations as well as a summary of the congenital and acquired epithelial defects of the uterovaginal canal. It then gives the history of a nineteen-year-old woman with a solid uterus who complained of severe attacks of dysmenorrhea. Upon palpation the uterus in this case was found to be practically normal, however the vagina ended in a blind pouch which had no connection with the cavum uteri. The operative findings revealed a normally sized uterus but transverse sections disclosed that it had no lumen. Both macroscopic and microscopic sections revealed a picture of intramural adenomyosis.

The author assumes that during earliest embryonal development a trauma had occurred which interfered with the normal growth of the cavum uteri. (K. HEISING) MATTHIAS J. SEIFERT M.D.

Kane R M. The Effect of Follicular Hormone Upon the Function of the Human Myometrium
 (W. Ku g des F. H. kelho mo sauf de f. nkt n de me chl chen Ut rusmu kulatu) 1 h f Gyn ek
 940 170 433

Examinations were made of the reactions of the uteri of 19 women having an approximately four week cycle to 15 units of orasthin by means of the intra uterine ball on method. These examinations were then immediately followed by endometrial biopsy.

A positive reaction to orasthin occurred only at the beginning and at the end of the cycle that is from the second to fifth and from the twenty-sixth to twenty-eighth days. No influence upon the uterus appeared during the remainder of the time. Elevation of the intra uterine pressure frequently produced enlargement (active dilatation) of the cavity.

The same examinations were conducted on women with more infrequent periods. The reaction to orasthin was observed in those cases in which the histological findings in the endometrium implied ovarian quiescence. The inactivity of both the follicular and corpus luteum hormones.

Four women with amenorrhea received follicular hormone the uterine grew and gradually became capable of modulation by elevated intra uterine pressure. Uterine contraction in this manner did not contract following injections of orasthin.

The uteri of 24 women with glandular hyperplasia gave positive reactions chemically at the time of bleeding during the menorrhagic interval. The reactions were negative.

The uterus acquires the capacity for positive reaction on probably only when the follicular hormone level drops. The author reaches the following conclusion:

So long as the follicular hormone exerts an effect upon the uterus there is a stimulus to growth of the muscle fibers and to hyperplasia of the interstitial tissue. At this time no contraction which raises the intracavitary pressure is to be expected in response to extract from the posterior pituitary lobe unless it is followed by a lapse which leads to dilatation of the cavity. If the follicular hormone is omitted the growth impulse stops and the muscle fibers regress. A contracting stimulus leads to reduction in the size of the cavity.

Strips of muscle excised from human uteri reacted indiscriminately positively or negatively to the addition of orasthin to the fluid in which they were suspended regardless of whether the endometrium was in a proliferative or secretory phase.

Measurements of the intracavitary pressure in 4 uteri with incomplete abortions revealed that 10 injections of orasthin led to contractions only when the pressure reached a certain height (this pressure was elevated by increased distention of the system).

In the opinion of the author labor occurs if the stimulus to further longitudinal growth of the muscle fibers and to the development of interstitial tissue disappears. The same impulse which previously effected an active dilatation that is enlargement of the cavity as a result of uncoiling of the spirally arranged muscle fibers causes an elevation of the intracavitary pressure following depletion of the follicular hormone effect. Thus labor is set in motion.

The author makes a practical application of this concept by administering 1 mgm. of follicular hormone every two weeks in cases of threatened abortion.

(BRETNER) O. THEODORE ROSE JR. M.D.

ADNEXAL AND PERIUTERINE CONDITIONS

MacFee W F. Benign Tumors of the Ovary Associated with Ascites and Pleural Effusion
 1 S g 94 3 549

The case of a fifty-four-year-old woman with a large multilocular cystadenoma of the ovary, ascites, and right pleural effusion is reported. She was treated by a piratical removal of the fluid from the pleural cavity and operative removal of the left ovarian tumor and the right ovary. There was no microscopic evidence of malignancy. The pleural cavity was again piratically drained a day after the operation and since then (after eleven months) there has been no further accumulation in the chest or abdomen and the patient has become entirely well.

It is pointed out that the syndrome of benign ovarian tumors, ascites, and hydrothorax is now a

GYNECOLOGY

recognized one. Fifteen cases have been reported and collected from the literature by Meigs. The present case is exceptional in that all the other reported tumors have been fibromas. This is the first cystadenoma reported as part of this syndrome.

RICHARD WARREN, M D

Platz, J. Six Additional Cases of Primary Carcinoma of the Tubes (Ueber sechs weitere Fälle von primärem Tubencarcinom). *Arch f Gynaek*, 1940, 170 604

The author reports on 6 cases of primary carcinoma of the tubes which were treated at the Second Clinic of the University of Munich in the period from 1925 to 1939. Up to date, 377 cases of primary carcinoma of the tubes have been reported and published. Of these, 8 have remained without recidivation for more than five years. Among the 6 cases reported by the author there is 1 more which is considered cured. The cases are described in detail, and their symptomatology as well as diagnosis is discussed.

The cured case is that of a fifty-three-year-old woman who was laparotomized at an advanced stage of cachexia. Only the adnexa were removed, because the peritoneum was already affected and 12 liters of ascitic fluid were present. The patient received post-operative irradiation, and now, seven years after the operation is alive and well.

In case of hemorrhage the author recommends only limited use of castrating irradiation because there is a possibility that an undiagnosed carcinoma of the tube might be the cause of the illness. The diagnostic value of a sample scraping is given particular consideration and the importance of histological examination of all anatomical operative preparations is stressed.

In all cases of hysterectomy only the ovaries and not the tubes should be allowed to remain.

(KRAUL) HILDA H. WHEELER

EXTERNAL GENITALIA

Cohn, A., Steer, A., and Adler, E. L. Further Observations on Gonococcal Vulvovaginitis. *Am J Syph, Gonorr & Ven Dis*, 1941, 25 329

In a study of gonococcal vaginitis, 1,070 examinations were made on 234 patients. Of these, 98.9 per cent were positive by culture and 67.1 per cent were positive by smear. This showed that cultures are superior to smears for diagnosis and determination of cure. Cultures are superior to smears also in rectal infections, which in this series were positive in 98.8 per cent by culture and in only 6.1 per cent by smear.

A study of 399 provocative tests failed to give conclusive results. Gonococcus vaccine, gonococcus filtrate, pilocarpine, aolan, silver nitrate, Lugol's solution, 50 per cent glucose, and 9 per cent sodium chloride all proved undependable.

Untreated cases undergo spontaneous cure within thirteen weeks in more than 50 per cent of patients. About one-fifth of these patients develop the carrier state, in which occasional positive cultures occur in the absence of clinical signs even after twenty-eight weeks of observation. However, all patients ultimately give negative cultures.

Sulfanilamide therapy resulted in cure in two-thirds of the hospitalized patients within two weeks of treatment. Sulfapyridine was followed promptly by negative cultures in all cases with recurrences in less than 10 per cent. Estrogenic substances brought about early clinical improvement, but it appeared that the course of the disease was little different from that in the controls.

Rectal infections were diagnosed by the findings of positive rectal cultures in 45 per cent of the patients. In none was there characteristic evidence of gonococcal proctitis clinically.

Contact with a source of infection either of a child or an adult, must be intimate before the disease can be transferred.

CHARLES BARON, M D

THE 'PRESSURE THEORY' OF ECLAMPSIA

A Collective Review with Selected Briefs

JOSEPH A. DAVIS B.M. and LEE O. SNOOK M.D.

Chicago Ill 1915

ECLAMPSIA has with reason been called the disease of theories. Among these many theories there is one which it seems has not been given adequate consideration. This idea first clearly stated by King in 1887 is that the primary derangement in eclampsia is a mechanical one of pressure on the abdominal viscera consequent upon the filling of the abdominal cavity by the rapidly enlarging uterus. Either in whole or in part this concept appears in medical literature; it has never been disproved. Recent experimental work especially that of Goldblatt (21) has added cogency to this old theory and necessitates its reappraisal.

The term *eclampsia* as used in this article includes syndromes referred to as low reserve kidney pre eclampsia and eclampsia. The following list of selected briefs demonstrates that the pressure theory has been current for many years and has been advocated by men prominent in the annals of medicine. The essential components of the theory are clearly defined in these several briefs.

SELECTED BRIEFS

1767 Morgagni (42) observed mechanical hindrance to the ureters during pregnancy.

1775 Alexander Hamilton (23) attributed convulsions in the advanced months of gestation to the irritation occasioned by distention of the uterine fibers or by pressure of the uterus on contiguous viscera which interrupted the natural functions of these parts and impeded the circulation of their fluids.

1827 Richard Bright (3) published his medical papers and called attention to the relation of vascular and renal disease.

1841 Rayer (52) who coined the term *hydrosis* noticed that pregnancy and labor were complicated frequently by albuminuria.

1841 Cruveilhier (15) was the first to observe distention of the ureter in pregnancy. His observations were made post mortem on women who died following confinement or during the later months of pregnancy.

1843 Lever (34) reported the presence of albumin in the urine of 9 patients with puerperal convulsions.

1843 Robinson (53) showed that complete or partial tying off of the renal veins resulted in the appearance of albumin blood or both in the urine and in enlargement of the kidneys.

1852 Meigs (40) stated that he rarely permitted his patients to lie on their backs during confinement because women who lie on their backs in labor especially the first labor are more liable to convulsions because of the greater pressure against the large vessels in the belly. This pressure he said could be relaxed in the absence of pains by the lateral decubitus.

1871 Halbertsma (22) implied that the discharge of urine through the ureters is hindered by pressure of the pregnant uterus or by catarrh of the ureters.

1877 Browne (4) reported a case of fibroid tumor of the uterus causing eclampsia.

1877 Cohnheim (10) noted cardiac hypertrophy in bilateral obstruction of the ureters due to a huge tone in the bladder.

1881 Lohlein (36) recognized the pressure theory of eclampsia and suggested the latero-ventral decubitus in the treatment thereof.

1883 Kucher (42) stated that pregnant women suffering from morbus Brightii are more susceptible to eclampsia because the insufficiency of the diseased kidneys can be aggravated by alteration in the ureters by means of stretching inflection or infraction which the increasing or contracting uterus can produce.

1884 Halbertsma (22) stated that the albuminuria of pregnancy is observed chiefly when the sizes of the gravid uterus and the abdominal cavity are disproportionate.

1887 King (31) stated that disturbances in the renal circulation and renal function are produced mainly by pressure of the gravid uterus upon the abdominal aorta or its branches upon the vena cava or its branches or upon both or all of these. He recommended postural treatment of eclampsia.

1887 Cazeaux and Tarnier (18) mentioned the tense abdominal wall in primiparas as a factor in support of the pressure theory of eclampsia.

1894 Tibone (58) stated that increased intra abdominal pressure may produce renal ischemia.

1897 Vaquez (60) and Nobecourt observed a rise in the blood pressure in eclampsia

1901 Dorland (18), in listing the exciting causes of eclampsia, mentioned sudden pressure by the gravid uterus upon the kidneys or their excretory ducts, or upon the abdominal aorta and the inferior vena cava and their large branches

1902 McReynolds (39), in his study of diastasis recti, attributed the condition to pressure effects of the enlarging pregnant uterus

1903 Zangemeister (61) noted the variability of the albuminuria during labor

1903 Hubert (26) believed that the albuminuria of eclampsia is caused by any obstruction to the circulation of blood in the kidneys, for instance, by compression of the vessels and ureters by the pregnant uterus

1905 Katzenstein (29) produced mild experimental hypertension by incomplete occlusion of the renal arteries

1905 Mynlieff (44) believed increased arterial tension is associated closely with the production of eclampsia. He regarded mechanical derangement of the kidney function, as by pressure on one or both ureters which produces an increased intrarenal tension because of the inelastic renal capsule, important in the pathogenesis of eclampsia

1906 Vaquez (59) noted that during labor the blood pressure rises and may attain great heights

1906 Cragin (14), in discussing pyelitis of pregnancy and the puerperium, regarded pressure on the ureters by the uterus as the cause

1906 Shaw (55) assumed that the substance causing arteriospasm and producing cerebral disturbances without post-mortem lesions was the hypertensive substance "renin"

1907 Chirie and Mayer (9) observed eclamptic manifestations and rapid death of dogs in which the renal veins had been occluded ten minutes

1908 Smith (56), in discussing pressure conditions within the abdomen, stated that the hydrostatic pressure at any point within the abdomen varies with the position of the body and the depth of the superimposed organs, and that during labor, contraction of the abdominal muscles causes an increase in the intra-abdominal pressure

1909 McClintock and Longcope (38) noted a rise in the blood pressure when the superior mesenteric artery was compressed forty-three times in five minutes. They observed a rise in the blood pressure upon compression of the aorta

1909 Schreiber (54), in a study on human subjects, observed that compression of the aorta

at or above the renal level in suitable cases causes albuminuria

1909, 1940 R. H. Paramore (47) repeatedly asserted that increased intra-abdominal pressure is the primary derangement in the hypertensive toxemias of pregnancy. He stated in 1932 that in eclampsia the underlying pathological process is almost peculiar to the latter months of pregnancy, an observation which in itself is sufficient to weaken irretrievably the idea that the disease is due to a poison specific of pregnancy. The great majority of women affected are primigravidas, women who up to pregnancy had been perfectly well, but in whom the abdominal wall never had been so stretched. For the rest, eclampsia occurs in cases of twin pregnancy, acute hydramnios, concealed accidental hemorrhage, and rapidly growing hydatid mole. All these conditions have one specific feature: a uterus enlarged more rapidly than normal, which produces the same physical effect as when the abdominal wall, *ab initio*, is good and the uterine enlargement average. As albuminuria is almost constant in pre-eclampsia and occurs early in that syndrome before malaise, edema, and headache, it is reasonable to believe that the preceding rise of the blood pressure is of renal origin.

1915 Hirst (25) recommended rupture of the membranes to reduce the blood pressure in eclampsia. He stated he had observed the pressure drop 100 points in a few minutes.

1915 Buschmann (6), in discussing his observations on unilateral renal involvement in eclampsia, suggested that the symptoms of eclampsia could be explained by the retention of substances which should be excreted. This diminished excretory power, he stated, is due primarily to venous stasis and to direct pressure of the gravid uterus on the kidneys.

1921 Gessner (20) noted a characteristic blood-pressure curve in eclampsia which was similar to the curve of the blood pressure in mechanical urinary obstruction.

1923 O'Connor (45) observed reduction of the blood pressure in prostatism upon relief of obstruction.

1924 Lee-Brown (33) in studying circulatory changes in progressive hydronephrosis concluded that the predominant change is an ischemic one which is due to increased intrarenal tension.

1926 Carson (7) observed the uterus resting upon the right ureter in post-mortem examinations of pregnant women.

1927 Crabtree (12) reported a case of unilateral stricture of the ureter with hydronephrosis in a patient who developed hypertensive toxemia.

of pregnancy and continued with a post partum hypertension. After nephrectomy the blood pressure returned to normal.

1927 Pedersen (50) produced experimental chronic hypertension in the rabbit by constriction of the renal veins with an aluminum band.

1927 Corwin and Herrick (11) on the basis of a clinical study suggested that certain toxemias of pregnancy were not independent conditions but were related to other well known clinical syndromes particularly nephritis and cardiovascular disease with hypertension.

1928 Kahn (28) found unilateral involvement of the urinary tract in 38 of 52 cases of hypertensive toxemia. He observed that as the renal involvement was improved by ureteral drainage the hypertension subsided.

1929 Mylius (43) demonstrated spastic and tetanic vascular changes in the retinal vessels in patients with eclampsia.

1931 Crabtree and Prather (13) stated that from their own observations and from the available literature they accepted as a working hypothesis that overdistention of the ureters and renal pelvis exists in all pregnant women as a direct result of a tight fitting uterus in an inelastic abdomen.

1932 Janney and Walker (27) demonstrated that the urinary output in pregnancy could be influenced by posture.

1932 Theobald (57) produced experimental hypertension by the introduction of a liter of paraffin into the abdominal cavity of dogs.

1933 Loesch (35) produced persistent hypertension by intermittent brief occlusion of the renal arteries, veins and ureters.

1933 Menendez (41) produced hypertension by constriction of the renal veins.

1934 Pavlovsky (48) stated pregnancy may be considered a great predisposing cause of pyonephrosis because of mechanical pressure of the pregnant uterus.

1935 Ahltop (1) concluded that symptoms such as tenderness, fatigue, pains in the abdomen or back, strong movements on the part of the fetus and palpitation were due to compression of the inferior vena cava and upward displacement of the diaphragm by the pregnant uterus.

1936 Haves (24) considered urinary back pressure as a cause of eclampsia and treated 20 cases by urinary drainage with improvement in all.

1937 Peters Lavietes and Zimmerman (51) in a study of 320 cases of eclampsia found that 13 per cent of the patients had suffered at some time from pyelonephritis. They concluded that

pyelonephritis is one of the etiological factors of eclampsia.

1937 Kretschmer and Kanter (12) demonstrated that the ureters above the pelvic brim as well as the renal pelvis were dilated in 100 per cent of pregnant women and that they returned to normal within twelve weeks after delivery.

1937 Kellar and Arnott (10) in a study of 33 patients dying of eclampsia noted ischemia of the glomeruli as the most striking pathological feature.

1938 Matthews and Der Brucke (37) in a study of 200 pregnant women weighing 200 lbs or more found albuminuria in 35 per cent, edema especially of the lower extremities in 43.5 per cent, and a higher incidence of headache, dizziness and gastro-intestinal disturbances than in women of lesser weight.

1938 Burwell (5) *et al* demonstrated the chief alterations in the circulatory system of pregnant women to be (1) an increased cardiac output, (2) a decrease in the arteriovenous oxygen difference, (3) a rise in the venous pressure in the lower extremities, (4) an increase in pulse pressure and pulse rate, and (5) an increase in blood volume. They concluded these changes are due in the main to two mechanisms: (1) an arteriovenous leak through the placenta and (2) an obstruction to venous return by the enlarged uterus.

1938 Dill and Erickson (17) produced eclamptic like syndromes in pregnant dogs and rabbits by constriction of the renal artery. All of the dogs exhibited hypertension, hematuria and albuminuria.

1939 Blalock, Levy and Cressman () demonstrated that unilateral renal ischemia combined with intestinal ischemia resulted in a prolonged elevation of the arterial pressure in a high percentage of animals studied.

1939 Fishberg (19) stated that eclampsia is caused by diminution in the renal blood flow from pressure of the enlarged uterus on the ureters and renal veins and occurs in women with an inherited predisposition to hypertension.

1939 Payne and Hodes (49) studied the effects of female hormones and of pregnancy upon the ureters of lower animals. Prolan, estrin and progesterone injections did not produce ureteral dilatation in rabbits or dogs. Intravenous urographic examinations of pregnant rabbits and dogs did not reveal any ureteral dilatation.

1939 Dieckmann and Brown (16) recommended rest in bed in the ventral decubitus with pillows or a canvas frame to support the body and thus permit the uterus to fall away from the pelvic brim.

1939 Page and Ogden (46), in an analysis of the physiology of hypertension in eclampsia, concluded that neither the blood volume nor blood viscosity is of primary importance, but that hypertension is due to an increased peripheral resistance. This resistance is most probably functional, as suggested by the marked lability of the blood pressure, the absence of histological changes in the arterioles, and the rapid subsidence, in most instances, after delivery.

1939 Goldblatt, Kahn, and Hanzal (21) considered the possibility of their studies on renal ischemia and hypertension as being pertinent to the problem of eclampsia. They stated that as this condition occurs only at a time when the uterus is greatly enlarged, it is at least possible that the mass may press on the aorta or both renal vessels sufficiently to produce renal ischemia. They suggested postural treatment of eclampsia to relieve this pressure.

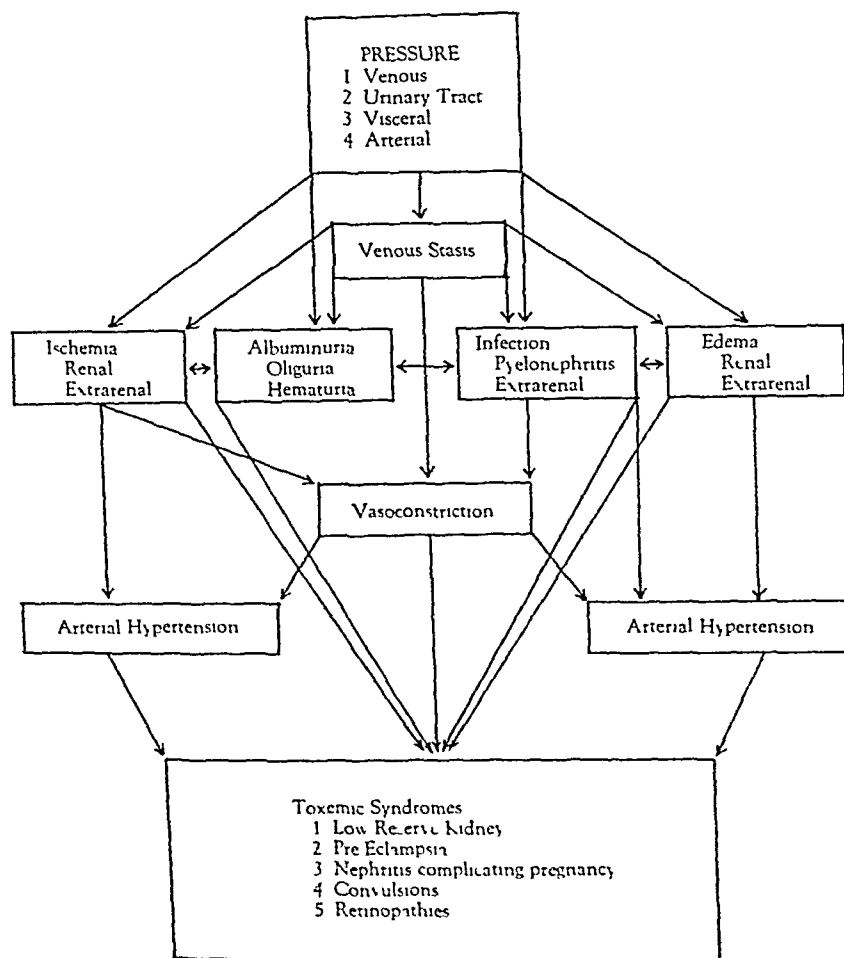


Fig 1 This diagram is a representation of the various ideas expressed in the literature concerning the relation of pressure of the pregnant uterus to the pathogenesis of the toxic syndromes of the late months of pregnancy

DISCUSSION

From an anatomical standpoint the renal veins and arteries the inferior vena cava the kidneys and urinary tract and the aorta are in a position to be compromised between the pregnant uterus and the posterior abdominal wall. This is true particularly of the left renal vein which lies between the aorta behind and the superior mesenteric artery and the muscle of Treitz in front. In pregnancy many investigators have demonstrated pressure of the enlarged uterus upon the right ureter and its relation to hydronephrosis and urinary tract infection. The predominance of right ureteral involvement is attributed to the usual right obliquity of the pregnant uterus and the protection afforded by the sigmoid colon on the left. The lordosis of pregnancy would make these visceral structures more vulnerable to pressure. The analogous lordotic albuminuria in children is consistent with this idea. In quadrupeds in which the hydrostatic pressure of the gravid uterus and of the intestines is exerted against the anterior abdominal wall toxemia is said to be rare.

The abdominal cavity is of limited size and distensibility. The addition of the rapidly enlarging uterus to the contents of this cavity during pregnancy should produce a compression of the other viscera or a distention of the abdominal cavity. That the distention occurs is obvious. That a compression of the other viscera may occur is a possibility. That hypertensive toxemias are more common in primiparas in whom the abdominal cavity and abdominal wall resists distention to a greater degree than in multiparas is consistent with a pressure element being important in the genesis of these disorders. In addition the toxemias are much more common in twin pregnancies and in polyhydramnios in which conditions the increase in the uterine mass would be more likely to exert compression. The clinical observations that the hypertensive toxemias almost uniformly occur in the latter part of pregnancy that they are relieved by delivery and that they are improved by rest in bed and sedation are consistent with the theory of mechanical origin.

Ischemia of the kidneys with resultant hypertension has been produced experimentally and observed clinically to originate by several mechanisms. Some of these are

- 1 Pressure on the renal artery and/or vein by various types of clamps
- 2 Pressure on the kidney by the oncometer and celloidin pack
- 3 Obstruction to the outflow of urine

- 4 Urinary tract infection
- 5 Limitation of the blood flow to the kidney by the pressure of tumors.
- 6 Pressure on the aorta and inferior vena cava by various methods

Of interest is the work of Dill and Frickson (17) who produced eclamptic like syndromes in pregnant animals by constriction of the renal artery. Also of note is the reduction of an experimental hypertension by the release of constricted vessels or by the establishment of an improved blood supply to the kidney. Theoretically all the above mechanisms could be duplicated by the pressure of the gravid uterus and an improved blood supply to the kidney would result through release of such pressure by delivery.

Thus the old pressure theory as interpreted today would be that renal ischemia produced by direct and indirect pressure of the gravid uterus causes widespread arteriolar constriction from which follows the altered physiology characteristic of the hypertensive toxemias of the late months of pregnancy.

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OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

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(Le rythme ovarien pendant la grossesse) *Rev
franc de gyné et d'obst.* 1941 36 18

Pregnancy suppresses menstruation and inhibits ovulation. However certain facts have been observed that suggest that the ovary continues its cyclic activity in a latent fashion during pregnancy and some authors have assumed that the cumulation of the period absent during pregnancy is one of the factors in producing labor.

In his study of the question the author has found that when a woman habitually has long intermenstrual periods her pregnancy is longer than that of one who has the normal periods. In working this out in a large number of cases he has found that the length of pregnancy is practically that of ten intermenstrual periods. Menstruation returns as a rule about six weeks after delivery that is after about one and a half menstrual periods. Sometimes there is a slight discharge of lochia or blood about fifteen days after delivery which some obstetricians have interpreted as a late obstetrical hemorrhage. After abortion menstruation is reestablished very frequently within a period varying from one to one and a half menstrual periods. Spontaneous abortions generally begin at a time that would have corresponded if menstruation had continued to the interval between ovulation and menstruation that is to say to the lutein phase.

In an examination of 180 miscarriages occurring in the course of 134 pregnancies the author found that in a small number of cases the hemorrhages had a periodicity that resembled that of menstruation. From these facts he thinks it reasonable to conclude that ovarian rhythm continues during pregnancy.

AUDREY G. MORGAN M.D.

Ballantyne A. J. Ocular Complications in Hyperemesis Gravidarum. *J. Obst. & Gynaec. B. & Emp.* 1944 48 206

Doubt is expressed by the author regarding the occurrence of purely neurotic cases of hyperemesis gravidarum and some support is given to the view that a deficiency of Vitamin B₁ and perhaps of Vitamin C is an important factor in etiology.

It is shown that the current description of the ocular complications as hemorrhage and optic neuritis appearing along with a notable loss of vision when the patient is gravely ill is incomplete and misleading. The earliest ocular disturbances are retrobulbar optic neuritis associated with a central defect in the field and without visible ophthalmoscopic changes. This is succeeded by a visible edema of the optic nerve and later by a characteristic type of peripheral retinal hemorrhage. The ultimate visual defect may amount to total or almost total

blindness which condition however is capable of complete recovery.

The profound visual loss and the form and situation of the hemorrhage along with the absence of exudates and vessel changes are important points in the differential diagnosis from ocular signs of cerebral tumor, subarachnoid hemorrhage, diabetes and hyperpnea. As the optic nerve and retina are essentially part of the brain the optic neuritis and retinal hemorrhages are more closely related to the cerebral complications of hyperemesis gravidarum than to the associated peripheral neuritis.

It is recommended that in the treatment of persistent vomiting in pregnancy the routine methods of rest, restoration of the fluid loss and correction of constipation should be supplemented by the intramuscular administration of Vitamins B₁ and C. If these do not give a rapid response and especially if polyneuritis, retrobulbar neuritis, papilledema or retinal hemorrhages occur prompt termination of the pregnancy seems to be called for. The cessation of vomiting may be decisive and should not in itself be accepted as a sign of recovery without consideration of the patient's general state and the condition of the vision and fundi.

The serious significance of ocular signs should be recognized before the appearance of changes in the retina and optic nerve. By the time that retinal hemorrhages and optic neuritis have become manifest the patient's life is in jeopardy and treatment may be quite ineffective.

A description is given of 6 cases of hyperemesis gravidarum with ocular complications of varying degrees of severity ranging from slight dimness of vision with utero-ophthalmoscopic changes to total blindness with gross hemorrhages and papilledema and it is recommended that even if an examination of the eyes cannot be carried out periodically in every case of pregnancy any sign of defective vision should lead to a careful investigation of the visual acuity and field of vision as well as of the fundi. Early diagnosis of the ocular complications will help to reduce the frequency of one cause of maternal mortality.

CHARLES B. BROWN M.D.

Wilson J. St. G. An Evaluation of the Treatment of Albuminuria of Pregnancy by the Water Balance Method. Auming the Theory of Water Intake in Pregnancy. *J. Obst. & Gynaec. B. & Emp.* 1941 48 6

At the Walton Hospital Liverpool 905 patients suffering from all types of albuminuria except the hyperemesis of early pregnancy were treated in a period of five years. The present article considers the particulars of 859 of these who were delivered in the clinic. Among these cases were 8 maternal deaths with 31 stillbirths and 45 neonatal deaths. There were 63 cases of eclampsia with 2 maternal deaths.

Every patient with albuminuria, whether slight or severe, attending the clinic is pressed to come into the hospital for investigation. The patient is put to bed and an ordinary mixed diet containing 20 oz. of free fluid is given. The balance is noted between the amount of fluid intake and the amount of urinary output, and if the output is about the equivalent of the fluid intake, the latter is maintained at that level for a time.

In a great majority of the cases this regime results in a lowering of the blood pressure, and in those which do not respond, an intravenous injection of magnesium sulfate and calcium gluconate is given until the blood pressure is within normal limits. If, however, the blood pressure does not appreciably diminish within from seven to ten days, the injections are discontinued, and in some cases a fall of blood pressure then occurs. Ten cubic centimeters of a 10 per cent solution of calcium gluconate and 10 c cm. of a 20 per cent solution of magnesium sulfate are given.

If a water balance between the intake and output is not established, then induction of premature labor is usually recommended. Complete drainage of the cerebrospinal fluid in these severe and persistent cases of hyperpnea is occasionally used as a preparation for the induction of abortion or premature labor to prevent eclampsia.

The routine treatment of eclampsia at the clinic is as follows:

- 1 Give $\frac{1}{2}$ gr. of morphia, 10 c cm. of 20 per cent magnesium sulfate solution, and 10 c cm. of 10 per cent calcium gluconate solution intravenously. If the patient is conscious give 30 gr. of chloralhydrate by mouth, and repeat every four hours.

- 2 If there is a fit within the first half-hour following the injection, give $\frac{1}{4}$ gr. of morphia, and repeat the injection of the magnesium sulfate and calcium gluconate solutions.

- 3 Every time the patient has a fit repeat the dose of magnesium and calcium solutions, but if the fits follow one after another, stop them by the inhalation of a minimum quantity of chloroform.

- 4 If there is no fit within the first half-hour of the injection, give $\frac{1}{4}$ gr. of morphia at the end of the first hour.

- 5 In the presence of deep coma, or a complaint of severe headache, perform lumbar puncture, and drain the spinal canal dry.

- 6 In the presence of much cyanosis and edema of the lungs, consider venesection and the administration of atropine.

- 7 Catheterization is necessary in the presence of coma. Postpone rectal lavage until the fits are well controlled, and do not give chloral by rectum until that has been done.

- 8 If fits are induced by catheterization and colonic lavage, control them with a minimum inhalation of chloroform.

- 9 Cardiac asthma is to be treated with coramine.

- 10 Consider gastric lavage only in the presence of repeated vomiting when the patient is comatose.

- 11 If labor is in progress, ensure that the lie of the fetus is longitudinal. When the presenting part is on the pelvic floor, the second stage of labor may be completed with the forceps.

The nursing consists of keeping the room dark, absolute quiet, Sims' posture, especially if the patient is comatose, and having a gag ready for use. If fits are frequent keep the gag in the patient's mouth continuously. An oxygen cylinder should also be prepared.

The induction of abortion or labor was practised on account of symptoms in 92 patients, abdominal hysterectomy with sterilization was done in 1 patient. Cesarean section was performed in 8 cases during labor for some obstetrical indication.

CHARLES BARON, M D

Orengo Díaz del Castillo, F. Investigations on the Kidney of Pregnancy (Investigaciones sobre el riñón del embarazo). *Rev. clin. española*, 1941, 2, 143.

In 1886 Levden described the syndrome "kidney of pregnancy," which is more common in the second half of pregnancy and is frequently confused with other renal conditions. The author reviews some of the literature pertaining to renal changes during pregnancy and demonstrates the variety of conflicting views which have been recorded on this subject. He studied the problem experimentally with the aid of the Addis technique of making cell counts on the urinary sediment. He studied cases of normal pregnancy, pregnancy with edema, nephritis, pre-eclampsia, and cases during the puerperium. His results are tabulated and record the amount of urine, density, albumin, erythrocytes, leucocytes, and hyaline, granular, and epithelial casts. He noted that the kidney of pregnancy has a diminished capacity for concentrating the urine, which defect disappears during the puerperium.

These studies indicate that in the kidney of pregnancy there is a disturbance of the glomeruli as well as of the tubules, however, the glomerular component is more prominent. This agrees with the fact that circulatory disturbances are more prominent in pregnancy. The urinary changes between normality and eclampsia are only a matter of degree. These changes are predominantly vascular in nature. The correct term for the syndrome occurring in pregnancy is "the kidney of pregnancy." This is neither a nephritis nor a nephrosis. It is merely a result of the colloidal, vegetative, and hormonal changes of pregnancy. Already existing nephritis and nephrosis are aggravated by pregnancy. In pre-eclampsia and eclampsia the glomerular component becomes accentuated and is associated with a vasoconstrictor crisis. During the puerperium the kidney returns to normal. Whatever harmful influence gestation has on the kidneys occurs in the last months of pregnancy. No more extensive classification of renal conditions in pregnancy is required than the following: (1) the kidney of pregnancy and (2) diseases of the kidney in the pregnant woman.

JACOB E. KLEIN, M D

Flaem ich E Shotgun Wound of the Pregnant Uterus (S hus let d s schwan e Ut ris) Ze t M f G v k 104 p 2

The case described is that of a girl fifteen years of age in late pregnancy who had shot herself in the abdomen with a 7 mm Flaubert bullet. The aperture of entry was located in the right upper region of the abdomen while the aperture of exit could not be located. Fluoroscopy disclosed the bullet to be lodged in the child's skull. The dead child was removed by means of a laparotomy and section. The bullet had penetrated the anterior wall of the uterus and the placenta which was attached at this site none of the other organs of the abdomen disclosed injury. Following careful suture of the incision and suturing-over and peritonization of the bullet hole the girl recovered without complications.

The child which weighed 1050 grams had received a perforating projectile wound through the left shoulder and then the missile had entered the left angle of the lower jaw to lodge in the middle fossa of the skull.

The treatment of gunshot wound of the gravid uterus should consist in the earliest possible laparotomy if the uterus is not emptied by section. A spontaneous extrusion of the product of conception occurs sooner or later in most cases.

(K HERSING) JOHN W BROWN M D

LABOR AND ITS COMPLICATIONS

Durst F The Modern Therapy of Labor in the Presence of Contracted Pelvis (M derme Th p e de G b t b e e g m Be le) Lije n vje 94 62 4

In the obstetrical material collected in the clinic of Zagreb contracted pelvis with a conjugata vera of 9 cm or less occurred 389 times among 11,271 births (3.45 per cent) during the years from 1932 to 1939.

The management of labor in contracted pelvis in the past was most frequently based on prophylactic measures (induction of early labor or the use of podalic version) and upon the classic cesarean section still later on symphysiotomy and pubotomy. The latter two methods have persisted until the present although only within very narrow margins of indication in the Zagreb clinic symphysiotomy was performed only 46 times from 1932 to 1939 in cases of moderate disproportion between the head and pelvis. However this procedure was never used in primiparas. The maternal mortality was zero and the fetal mortality was 5 per cent. The classical cesarean section has been completely replaced by the cervical cesarean section. The author discusses in detail the indications and contraindications under which according to the cesarean rule the cesarean section may and should be carried out in cases of contracted pelvis and also when this procedure should not be taken into consideration.

In the Zagreb clinic this procedure was carried out for the first time in cases of contracted pelvis during the

course of eight years in 7 cases the Doerfler procedure with eversion was used in 85 cases a cervical transverse incision without eversion (1 fatal due to peritonitis) in 1 case classic cesarean section was used in 3 cases the extraperitoneal approach in 4 cases a cervicocorporal cesarean incision was made according to Franz and in 1 case a Porro operation was done and death resulted from hemorrhage. The maternal mortality therefore amounted to 2 per cent of which 2 per cent was due to infection. The amniotic sac in 25 cases ruptured five hours before the therapeutic procedure in 2 cases ten hours before in 9 cases fifteen hours before and in 3 cases twenty hours before in 1 case rupture of the sac occurred more than twenty hours before. The fetal mortality amounted to 1 per cent. Symphysiotomy was performed 24 times. The total of both procedures therefore amounted to 125 of 389 cases or 32 per cent. In certain cases in which the mother refused consent for cesarean section craniotomy had to be done.

The author furthermore describes the technique and results of roentgenological pelvic measurement. He joins in the opinion of other authors that it is better to wait with roentgenological examination until a few hours after the rupture of the amniotic sac when the head lies directly on the pelvic entrance and the pelvis has already prepared for several hours. In the event that at this time either by external or internal examination the prognosis is not clear a roentgenogram should be taken. This is done most advantageously (in profile) because it is during this time that the cephalopelvic disproportions are best visible. If at this time when the head is already shaped the latter still protrudes beyond the inner margin of the symphysis there is indication for cesarean section. In cases of pelvis with a conjugata vera of 8 cm or less the author employs x-ray examination at the termination of pregnancy without fluoroscopy.

In conclusion the author emphasizes the importance of careful examination of the pregnant patient as the result of which the contracted pelvis can be recognized in good time and the patient admitted to the hospital.

(V. M. JANISCH RASKOVIC) HARRY A. SALZMAN M D

NEWBORN

Henderson H, Foster E B and Eno L S The Relative Effect of Analgesia and Anesthesia in the Production of Asphyxial Neonatal Rumors J Ob G & G 94 4 596

Ninety and four tenths per cent of babies born when the mother is under the influence of analgesia show no evidence of clinical asphyxia. Causes other than the use of analgesia or anesthesia are found in two thirds of the infants that are clinically asphyxiated and may be present in three. General anesthesia definitely decreases the respiratory response of the newborn. The percentage of a physiated baby of

amnesic mothers delivered under local anesthesia is comparable to the percentage expected when unnarcotized mothers are delivered under light ether or chloroform anesthesia

When properly supervised and in the hands of those familiar with their use, analgesics *per se* do not increase the incidence of asphyxia. Neither anesthesia nor analgesia, properly controlled, need be a factor in the production of stillbirths. In the majority of cases asphyxia neonatorum is due to interference with the transfer of oxygen from the maternal blood to that of the fetus. The use of local anesthesia whenever possible will reduce the natural hazard of birth.

EDWARD L. CORNELL, M.D.

Huber, C. P., and Shrader, J. C. **Blood Prothrombin Levels in the Newborn.** *Am J Obst & Gynec*, 1941, 41: 566

Repeated observations of the blood prothrombin level were made on 506 infants. There were, in addition, 15 stillborn infants and 9 infants who died during the neonatal period. This represents a gross fetal mortality of 4.5 per cent. Of the 9 infants who died during the neonatal period, 2 received Vitamin K subsequent to delivery, 4 were born of mothers who received Vitamin K during labor, and 3 were in the control group. In 2 of these 9 infants a clinical diagnosis of cerebral hemorrhage was confirmed at necropsy. The mothers of each of these infants had received Vitamin K during labor.

In the first case a hydrocephalic infant with a lumbar spina bifida was delivered by low forceps application and extraction. Death occurred forty-two hours after birth, following frequent attacks of cyanosis, impaired respiratory activity, and convulsive movements. Necropsy showed a fracture of the

frontal bone and extensive intracranial hemorrhage. The second infant was delivered naturally following an episiotomy after a forty-hour labor. Respirations were spontaneous and the infant appeared in good condition. A cyanotic attack with difficult respiration occurred twenty-two hours after delivery, and the infant died at thirty-nine hours. The prothrombin determination following the initial evidence of cerebral irritation was 50 per cent of normal. Two milligrams of the Vitamin K preparation were given by gavage nine hours before death. Necropsy showed an intracranial hemorrhage as the cause of death. In neither of these infants are we justified in assuming that a low prothrombin level in the blood was a factor in the intracranial hemorrhage. In the first case there was obvious trauma, and in the second infant the clotting activity was not significantly impaired.

Normal infants show a physiological decrease in prothrombin activity in the blood, which reaches a maximum during the third day of life. A spontaneous return to a normal level occurs during the first week of life.

A wide variation is noted in individual infants in the depth of this decrease and in the rapidity of the return to normal levels. This decrease in clotting activity can be prevented by the administration of Vitamin K preparation to the infants during the early hours of the neonatal period or to the mother during the course of labor.

A potential relationship exists between the level of prothrombin activity in the blood and the severity of intracranial hemorrhagic tendencies in the newborn infants.

Two methyl-1, 4 naphthoquinone exhibits an active Vitamin K effect. EDWARD L. CORNELL, M.D.

GENITO-URINARY SURGERY

ADRENAL KIDNEY AND URETER

Katz F and Mainz F Successful Grafting of the Adrenal Gland in a Case of Addison's Disease *B J U J* 194 1 67

In a severe case of Addison's disease the adrenal gland of a patient belonging to the same blood group who had just died was grafted into the abdominal musculature

The functional results as observed over a period of fifteen months after operation are excellent. A state of compensation has been produced so long as the patient lives under normal conditions. Only after special exertion or during a transitory infection with added demand on the adrenal are slight signs of insufficiency noted. **JOHN A LOE M D**

Bergman R T Vaginal Ureterolithotomy *J U of* 94 45 176

A brief historical survey of vaginal ureterolithotomy is made and attention is called to the vaginal surgical approach in the female for impacted calculi in the lower ureter. The technique used by the author is presented. It offers the possibility of successfully retrieving a stone from a ureter. In a few of his cases in which the stone was not impacted and slipped up the ureter a Johnson basket dislodger was successfully used to retrieve the stone. Previous manipulative attempts with the same instrument cystoscopically had met with failure and the author believes this is a valuable adjunct in the surgical procedure. A short résumé of the postoperative treatment and the complications is given. **D E MURRAY M D**

BLADDER URETHRA AND PENIS

Wheeler W K Periostritis Pubes Following Suprapubic Cystostomy *J U of* 1941 45 467

Periostritis pubes is a definite clinical entity which simulates acute bone atrophy rather than periostitis and presents the following characteristics:

1. It develops only after suprapubic operation when the bladder is opened. It appears any time after two weeks.

2. There is extreme pain in the pelvis when the patient attempts to move. Tenderness is present over the affected area, i.e. the pubis and ischium.

3. Adductor spasm of the thighs is always present. There is inability to spread the legs or to walk.

4. The ramus descloses a mottled rarefaction of the pubis and ramus of the ischium. This becomes diagnostic as the disease advances.

5. Pierces' fenestration and bone are separated from the ramus in the softening or atrophic stage at the muscle tendon insertions.

6. It is a self-limited disease which requires no surgical intervention. **JOHN A LOE M D**

Parmenter F J Diverticulum of the Female Urethra *J U of* 94 45 479

Eight cases of diverticulum of the female urethra are reported and discussed under the headings which follow.

Etiology. There is no general agreement as to whether the origin of urethral diverticula is congenital or acquired. The probability is that both views are correct. Johnson suggests that an acquired diverticulum may be due to (1) trauma at childbirth, (2) infection of the urethral gland with exfoliation of the opening to the urethra, the formation of an abscess and re-establishment of communication, (3) instrumentation of the urethra especially deep fulguration, (4) urethral stricture and (5) urethral stone. He believes that a congenital diverticulum may be due to (1) Gartner's duct, (2) cysts formed from faulty union of the prima folds, (3) cell nests, (4) the Wolffian duct and (5) vaginal cysts.

Symptoms. Frequency, urgency and difficulty a lump in the vagina, pain upon walking or upon coitus and intermittent discharge from the urethra especially when douching are the prominent symptoms. Some patients discovered that they could obtain relief by inserting the finger in the vagina and emptying the diverticulum.

Diagnosis. The patient will have urinary symptoms. She may or may not complain of a mass in the vagina presenting at the vulva. The diverticulum which feels soft and fluctuating can easily be recognized on vaginal palpation. If pressure is made upon it with the labia separated, pus or urine or both will be seen to drip from the meatus with disappearance of the mass. Cystourethroscopy will demonstrate one or more openings usually on the floor of the urethra or slightly above on the lateral walls. The opening of the diverticulum is usually just in front of the sphincter. A small urethral catheter can be passed and will coil up in the diverticulum and be readily seen by means of x-rays following injection of contrast can be injected through the catheter and a diverticulogram made.

Treatment. Treatment may be conservative or radical though the latter is undoubtedly the method of choice except under unusual circumstances. The technique used is radical removal of the sac which is ligated and amputated at the urethral junction. The stump is inverted up into the urethra by two layers of interrupted No. 00 chromic catgut sutures. The mucous membrane is closed with No. 1 chromic catgut suture. Silk is not used because it may become a foreign body as it did in one of the author's cases of a convaginal fistula. An indwelling catheter which must be kept draining is left in place for ten days. The vagina is also lightly packed with gauze soaked in an appropriate antiseptic which is changed daily on every other day as indicated. One of the usual urinary antiseptics which

has been given internally a few days prior to the operation, is continued
JOHN A LOFF, M D

GENITAL ORGANS

Trabucco, A New Ideas in Regard to the Pathogenesis of Adenoma of the Prostate (Nuevos conceptos sobre la patogenia del adenoma prostático) *Rev argent de urol*, 1940, 9 377

The author discusses the various theories that have been held at different times and by different authors in regard to the pathogenesis of adenoma of the prostate gland. He considers particularly the theory that this form of tumor does not originate in the gland itself but in the so-called periurethral glands. He believes that these glands are periurethral only in location, and that in reality they are made up of true prostatic tissue, their gland function is latent but it may be developed at various periods of life by stimuli of endocrine origin.

An adenoma may develop in any part of the prostate gland, or in these so-called periurethral glands in the lower wall of the retromontanale urethra, which are really true latent prostatic glands. The adenoma tends to develop toward the bladder and urethra because it is only in that direction that resistance is not offered by the surrounding tissues. For that reason the majority of the adenomas that develop so as to become true tumors are the prepermatoc ones.

There is a capsule around the adenoma formed by the true gland tissue which is compressed and pushed aside. This capsule, however, includes not only the true gland tissue but also other small adenomatous nodules which have been overgrown and pushed aside by the dominant one which develops into a true tumor.

Histological pictures of a number of adenomas of the prostate are given which tend to support the author's theory
AUDREY G MORGAN, M D

Dorman, H N Transurethral Prostatic Resection
J Urol, 1941, 45 411

Prostatic resection is a satisfactory way to treat many types of prostatic obstruction. In the author's series, 84 per cent of all obstructing glands were treated by resection.

Prostatic resection can be performed by the average well trained urologist who is willing to apply himself diligently until the exacting details of resection are mastered. It is the simplest way to relieve obstructive symptoms in the more debilitated men and those suffering with advanced carcinoma.

All urologists cannot become expert resectionists. However, our younger urologists, and those being trained at the present time, should avail themselves of every opportunity to become proficient in the technique of resection.

The importance of adequate equipment, thorough preparation of each patient, intelligent nursing care, and meticulous attention to the details of resection are stressed
JOHN A LOFF, M D

Gutierrez, R Perineal Prostatotomy and Prostatotomy for the Removal of Prostatic Calculi
Ann Surg, 1941, 113 579

Prostatic calculi are more frequently observed than one might believe from a study of the medical literature. In fact, they are rather a common finding, clinically, operatively, and, especially, at autopsy.

Etiologically, prostatic calculi may be classified in three groups: endogenous—when they are formed in the substance of the gland, exogenous—when, coming from the upper urinary tract, they become deeply imbedded within the region of the prostatic urethra, and mixed or endo-exogenous—when, originating in the prostate, they come in contact with the exogenous elements of the urine which accelerate their growth so that they become in reality prostatic-urinary calculi. The intimate interrelationship of these three types of prostatolithiasis may frequently be observed in the same individual.

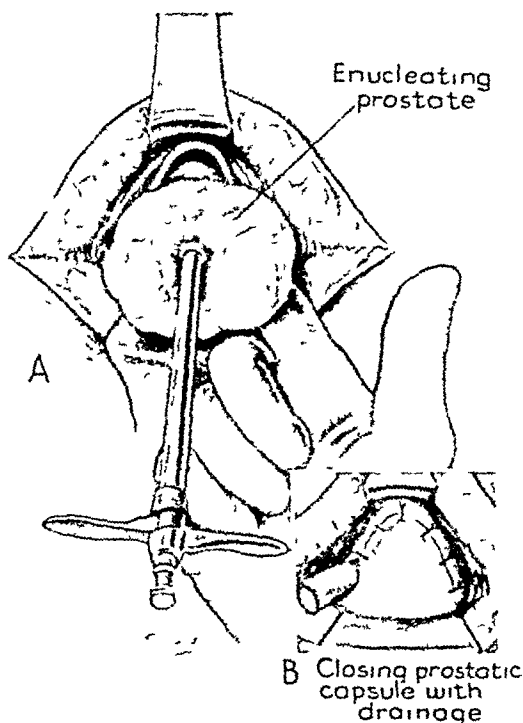


Fig 1 Drawing to illustrate the operative technique of perineal prostatectomy, particularly when prostatolithiasis is associated with adenomatous hypertrophy. (a) After the usual perineal surgical exposure, the capsule is opened and a retractor inserted through the prostatic urethra into the bladder, without opening the membranous urethra. The nucleation of the adenoma is then accomplished with the index finger, following the line of cleavage, thus removing the entire organ in one piece. (b) The capsule is closed by interrupted sutures, leaving a cigarette drain in one angle of the wound.

The diagnosis was made by rectal palpation in 67 per cent of the cases, and in 100 per cent of the cases submitted to roentgenologic examination. No urographic examination should be considered complete unless the region of the prostate is examined, since the discovery of clinically unsuspected prostatic calculi is common.

Of 29 cases herewith reported, 17 came to operation, and, of these, 13 were cured and 4 showed improvement. Of 12 cases not operated upon but treated medically and urologically, 5 showed improvement, and 7 showed none.

The paramount surgical consideration is not merely the removal of all prostatic calculi, but also the maintenance of open drainage, in order to relieve the infection and restore good function, if permanent cure is to be obtained.

The best surgical treatment, when operative intervention is indicated, appears to be perineal prostatolithotomy. When the condition of prostatolithiasis is associated with adenomatous prostatic hypertrophy, perineal prostatectomy assures a permanent cure.

Since the stones, as a rule, are multiple and lie in closed infected pockets in cases complicated with prostatitis, or lie near the capsule in cases of adenomatous prostatic hypertrophy, it appears that endoscopic prostatic resection is not applicable in the majority of these cases. D. E. MURRAY, M.D.

Maver, R. Prophylactic and Curative Treatment of Metastases of Malignant Tumors of the Testicle (El tratamiento profiláctico y curativo de las metástasis de los tumores malignos del testículo). *Rev. med. d. Rosario*, 1941, 31: 105.

The author describes 9 cases of metastases of malignant tumors of the testicle treated by roentgen irradiation between July, 1934, and October, 1940. The results were so good that he urges collaboration between clinician, surgeon, and roentgenologist in bringing these patients for treatment as early as possible and in the application of roentgen treatment for the prophylaxis rather than the cure of metastases.

In any case of tumor of the testicle the organ and the tumor should be removed. Syphilis, tuberculosis, and other conditions which cause enlargement of the testicle can be excluded by suitable examinations. In 1 of his cases the patient refused resection of the testicle. In this case he used a tension of 200 kv, 50 cm focal distance, a filter of 2 mm of copper and 3 mm of aluminum and gave a dose of 3,500 roentgens in ten days. This caused a violent radioepidermitis which healed in twenty-five days. The treatment was given in July, 1939, and in October, 1940, the patient was still well.

The dosage and technique depend on the localization of the metastases. Abdominal metastases are irradiated from 4 anterior fields with their vertices at the umbilicus, generally a dose of 1,600 roentgens measured in air brings about total disappearance of the gland metastases. The dose per field and per day

is very important. Too large a dose causes vomiting, anemia, loss of appetite, and insomnia.

Generally only one field was irradiated per day and a dose of from 160 to 400 roentgens given. A blood count should be made every week and even more frequently if possible.

Mediastinal metastases are much more sensitive to irradiation than metastases in the lungs. For mediastinal metastases the author recommends a dose of from 200 to 250 roentgens per field per day, large masses of glands can be made to disappear with a total dose of 3,500 roentgens. However, in the lung even doses of from 150 to 200 roentgens per day may have serious effects on the general health. The only death in the author's series was that of a man with lung metastases whom he irradiated with a dose of only 125 roentgens per day per field over two fields, one anterior and one posterior. The man was in serious general condition and the blood count was not followed up with sufficient care. In such cases very moderate doses should be used even though this prolongs the treatment greatly.

AUDREY G. MORGAN, M.D.

MISCELLANEOUS

Rakovec, S. Urogenital Tuberculosis (Die Urogenitaltuberkulose). *Zdravot. věstník*, 1940, 12: 206.

During the last few years the number of nephrectomies for urogenital tuberculosis has been increasing because of the better diagnostic methods, and this has resulted in a lower mortality for this disease. Socially it is of significance that urogenital tuberculosis attacks people between the ages of twenty-five and thirty-five. It is a secondary tuberculosis, the primary focus usually being in the lung.

In all urological complaints one must think of tuberculosis. In the uropoietic system it is almost the rule that the kidney is affected primarily. It is generally recognized today that involvement of the kidney is by the hematogenous route. The process in the kidney takes place similarly to that in other organs: (1) tissue injury, (2) exudation, and (3) proliferation. The first phase usually takes place in the sensitive epithelium of the glomeruli. For the second phase, exudation, a wide field is open. The formation of cavities is caused by proteolysis. The author classifies the condition into two forms, the miliary and the chronic cavernous form. The second form may lead to generalized tuberculosis of the urogenital tract. The extension may occur by three different ways, again hematologically, by way of the lymph stream, or by way of the urinary stream. Bacilli, leucocytes, or red cells may be absent in the urine, but in spite of the negative findings the urine may contain albumin and be of diagnostic significance. Disturbed kidney function and a defect appearing in the pyelogram are further diagnostic symptoms. With ureteral tuberculosis there is also usually tuberculous peri-ureteritis. In the diagnosis of bladder tuberculosis shrinkage of the bladder with decreased capacity is important. The so important

early diagnosis of kidney tuberculosis is made difficult because of the lack of early symptoms. In advanced cases we had pollakiuria and terminal micturition pain. In 5 per cent of the cases there is a hematuria without pain and in another 5 per cent there are typical colic attacks. Every case of cystitis which lasts longer than six weeks should be suspected of tuberculosis. The same is true of hematuria of undetermined origin, microscopic hematurias with pyuria and pollakiuria with normal urine findings.

Thirty three per cent of all diseases of the urogenital tract are upon a tuberculous basis. The urine should be examined for tubercle bacilli microscopically by culture and by animal injection. In catheterization of the ureter for tubercle bacilli the urethral catheter should be introduced only 10 cm so as not to drag organisms from one kidney into the other. In examination of the divided urine leucocytosis on only one side points to tuberculosis. Retrograde pyelography is more definite in diagnosis than is the intravenous type. The most exact diagnosis is always made by animal injection.

Nephrectomy which removes the primary focus is the treatment of choice. The prognosis of the surgical treatment is variable and depends upon the duration of the disease. In most cases the patient reaches the surgeon too late. With early operation 80 per cent of the cases may be cured, later only 60 per cent. One may speak of healing if within three years no bacilli and leucocytes appear in the urine. Bilateral tuberculosis of the urinary tract is rare; it occurs in from only 10 to 12 per cent of the cases. In these cases operation is of course contraindicated.

In conclusion the author discusses epididymal tuberculosis and states that in all instances of this condition one must think of kidney tuberculosis. Epididymectomy results in cure in 90 per cent of the cases. Tuberculosis of the prostate and seminal vesicles is treated conservatively.

(G E ORA) LEO A JUNK, M.D.

Cifuentes Delatte L. The Male Sex Hormones
(Sblichman, Alesma, et al.) Rev. It.
p. 117, 94, 2, 1

The author first reviews the literature on the endocrine activities of the sex glands beginning with the work of Berthold (1849) and Brown-Séquard then down to modern times with the synthesis of testosterone by Butenandt. He then describes and classifies the natural androgenous substances. Among these he includes testosterone (isolated from the testis of the bull) and osterone (from male urine), dihydroandrosterone (from male urine), progesterone (a bi-cyclical hormone from the corpus luteum), androsterone (from the adrenal cortex), pregnanetriol (from female urine) and an androgenic and masculinizing effect, desoxycorticosterone (from the adrenal cortex) and a number of less well known substances. The chemical nucleus of these hormones is a sterol analogous to cholesterol, the only differences being in the side

chains. These substances are tested biologically by their effect on the rooster's comb, prostate and seminal vesicles. The biological unit is the effect of 0.1 mgm. of crystalline androsterone on the rooster's comb which is called 1 international unit. The chemical testing of these substances is based on the colorimetric reactions of Zimmermann in which varying color reactions are induced by the chromogenic ketone group. There seems to be a close correlation between the chemical tests of Zimmermann and the biological tests.

In discussing the metabolism of testosterone the author indicates its hypothetical formation from cholesterol as follows: cholesterol \rightarrow androsterone \rightarrow androstenediol \rightarrow testosterone. The blood of the normal adult male contains small quantities of testosterone which are eliminated in the urine in the form of androsterone. In the absence of the testes small amounts of androgens are still eliminated in the urine. Thus Hoskins and Webster found in a study of 2 eunuchs that 6 international units of androgens were eliminated daily. However, in the absence of testes the relation of androsterone to dihydro and osterone was 4:1 as compared to the ratio of 1:1 in the normal male. The source of these androgens in the castrated individual is as yet controversial. Experiments have indicated that some testosterone is destroyed in the liver and kidneys although the liver does most of the destruction work in man. Almost all of the estrogens are inactive by mouth. Zondek has demonstrated that the estrogens are inactivated if incubated *in vivo* with liver pulp. Glanville and his collaborators have observed gynecomastia with high values of urinary estrogens in 8 men suffering from cirrhosis of the liver. There is still much to be learned concerning the relation between the liver and the sex hormones. Day has reported that there are liposoluble X substances in the testes which re-enforce the action of testosterone.

There is no complete absolute sex specificity of the gonads. In unusual circumstances the ovaries may produce androgenic substances. Hill demonstrated this experimentally by transplanting the ovaries of rats out of the abdominal cavity when the ovaries are thus exposed to a low temperature they form androgenic substance which cause hypertrophy of the clitoris and other symptoms of masculinization. Hill notes a great similarity between the androgens so produced by the ovaries and testosterone.

The adrenals have an androgenic activity, part from the cortical hormone (desoxycholesterone), androsterone and 17 β -hydroxyprogesterone. In castrated rats the adrenal gland has been shown to assume a masculinizing function. Adrenalectomized rats which have also been castrated do not develop those which retain the adrenal gland. This comparative action of these glands has led to the formation of compensatory adenomas of the adrenal cortex according to Spiegel. From clinical experience it has been known that cortical tumors in the

adrenal gland exert a virilizing influence in the female

The effect of the pituitary gland on masculine gonads In general the urinary gonadotropic hormones of pregnancy are identical with the pituitary hormones. The pituitary gonadotropic hormones cause an increase in weight of the testes in experimental animals and also stimulate spermatogenesis. The author discusses some of the biochemical differences in detail.

The action of androgens on masculine gonads Testosterone overcomes the atrophy of the prostate, seminal vesicles, and vas deferens resulting from castration. However, there have been reports that testosterone may also cause a loss in weight of the testes and may inhibit spermatogenesis. According to Cutuly and Cutuly, only one phase of spermatogenesis, the reduction-division phase, is under the influence of the gonadotropic hormones. Furthermore, in a series of biological experiments on rats, frogs, salamanders, fishes, and birds, testosterone was shown to exert a masculinizing influence on the female and even on the embryo. There is no hormone known that is purely unisexual in its effects. Butenandt noticed an estrogenic effect of testosterone on the young female rat. In reptiles testosterone has a greater estrogenic effect than in mammals. The synthetic hormones also have this multiple action. Among these, ethenyltestosterone has estrogenic and androgenic action as well as progesterone activity. Furthermore, testosterone possesses a trophic action on the kidneys. Large doses may cause pathological changes in the kidneys, thus, Paschkiss and Fels observed urolithiasis in 14 of 46 rats which were given large doses of testosterone propionate.

As to the mode of administration of testosterone, it is usually given subcutaneously or intramuscularly or by the subcutaneous implantation of the crystalline tablets. The usual dose is from 10 to 25 mgm 2 or 3 times a week. In a eunuch of thirty-eight years the minimal effective dose was 40 mgm of testosterone propionate per week, which was given by subcutaneous injection.

As concerns the danger of cancer formation, this is less with androgens than with estrogens. Thus far there have been no clinical reports as to the occurrence of malignancies after the administration of androgens.

The clinical indications for male sex hormones are deficient testicular function and need for stimulation of the secondary sex characteristics. In eunuchism and absence of the gonads only androgenic substances are effective, since the gonadotropic substances of the hypophysis act only by stimulating the tissues of the testes. In cases of hypogonadism, McCullagh and McGurl have obtained good effects on the secondary sex characteristics, libido, and sex function by the use of testosterone. In cryptorchidism testosterone may be used when there are symptoms of hypogonadism. Thus McCullagh successfully treated 3 cases of cryptorchidism which had not responded to treatment with extract from the anterior lobe of the hypophysis.

In gynecology good results have been obtained by the use of testosterone propionate in the treatment of metrorrhagia and menorrhagia. Male sex hormone has also been used in the treatment of chronic mastitis, dysmenorrhea, and the postmenopausal disturbances. Its use is contraindicated in pregnancy because of the danger of producing an abortion or possibly a condition of intersexuality in the fetus.

Male sex hormones have been used in the treatment of prostatic hypertrophy with varying results. There has been noted general improvement and better micturition, this is ascribed to the stimulating effect on the bladder musculature. The size of the prostate has not been influenced. There have been a number of theories proposed as to the causation of prostatic hypertrophy in old men. Jongh and Laqueur have suggested that there is a diminution of the male sex hormone in old men as compared to the proportion of the estrogens. There have been contradictory findings and views on this aspect of the subject. Thus Kochakian reported a diminished excretion of androgens in the urine of old men. The treatment of prostatic hypertrophy is still based on surgical principles.

JACOB E. KLEIN, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES JOINTS MUSCLES TENDONS ETC

Sciatic Pain in Low Back Derangements Its Incidence Significance and Treatment A Symposium

Chandler F A Introduction

Willis T A Anatomical Variations and Roentgenographic Appearance of the Low Back in Relation to Sciatic Pain

Craig W McK and Walsh M N Neuro Anatomical and Physiological Aspects and Significance of Sciatica

Kuhns J G Conservative Treatment of Sciatic Pain in Low Back Disability

Barr J S and Mixer W J Posterior Protrusion of the Lumbar Intervertebral Discs

Farrell B P and MacCracken W B Spine Fusion for Protruding Intervertebral Discs

Meyering H W Low Backache and Sciatic Pain Associated with Spondylolisthesis and Protruded Intervertebral Disc Incidence Significance and Treatment

Ober F R Fasciotomy for Sciatic Pain

Heyman C H The Relief of Low Back Pain and Sciatica by Release of Fascia and Muscle

Freilberg A H The Fascial Elements in Associated Low Back and Sciatic Pain

Badgley G E The Articular Facets in Relation to Low Back Pain and Sciatic Radiation
J Bone Joint Surg 1941 23 407-45

FREMONT A CHANDLER This subject of sciatic pain in low back derangements is slowly yielding to careful scientific study and analysis. There are many potential etiological features in this syndrome and treatment is chosen from a variety of therapeutic measures. There is no panacea and the orthopedic surgeon follows the oscillations of the therapeutic pendulum and with the accumulation of experience charts his own course of procedure in each case.

THEODORE A WILLIS The acceptance of congenital anomalies low in the back as the cause for sciatic pain has been temporarily overemphasized.

Congenital anomalies of the lumbosacral and sacroiliac areas of the skeleton are of interest in the syndrome of low back pain and sciatica either as predisposing or etiological agents or as factors preventing recovery from these symptoms following injury. Certain anomalies weaken the anchorage of the spinal column to the pelvis others expose the contents of the neural foramina particularly the last presacral nerve roots to impingement stress or irritation from postural faults or disease.

The lumbosacral junction is the particular part of the human spinal column most subject to mechanical strain and most often involved in anomalies and defects of development.

It is doubtful whether the lateral symmetrically enlarged transverse processes which do not impinge upon or articulate with the sacrum really weaken the sacroiliac junction. Since processes of sacral nerves

develop simultaneously it is improbable that they are maladjusted but with the development of lordosis or muscle spasticity the tension on the nerve or blood vessels might be increased as in cervical rib syndrome.

Asymmetrical anchorage of the lumbar column to the pelvis predisposes the part of the back involved to strains and sprains. The asymmetry may be in the size and attachment of the transverse processes or in the planes and inclinations of the articular facets.

A congenitally narrow lumbosacral interspace approaching the first sacral interspace in depth diminishes the size of the foramina through which the last lumbar nerve roots emerge and thus increases liability of the transmitted nerves to pressure from accident disease or lordosis.

The lumbar spinous processes provide large surfaces for the attachments of the powerful ligaments and muscles that stabilize the lower back.

Skeletal anomalies are often associated with defects of the soft tissues particularly of nerve tissue. A cleft of the neural arch may be associated with defective development of the spinal cord and its nerve roots in minor as well as major spina bifida.

A lesion more definitely affecting stability of the lower back is the lateral defect of the neural arch. Hitchcock attributes this to a fracture of one or both laminae incurred in early infancy before they are well ossified or fused. The injured cartilaginous tissue fails to ossify and the anchorage of the spinal column to the sacrum depends upon fibrous union only. The incidence of laminar defects is about 5 per cent.

Muscle fatigues in the lower back gives rise to discomfort which increases as the cause of fatigue continues. As the musculature fails more and more strain falls upon the ligaments and joint structures. These inelastic tissues gradually give way and inflammatory changes occur together with so-called restricted mobility and pain both locally and along the distribution of the nerves that supply the affected parts.

Possible mechanisms of low back and sciatic pain resulting from congenital skeletal anomalies are chronic muscle strains and ligament sprains tension on or compression of nerve roots and associated anomalies of nerve tissue.

There is still a greater incidence of anomalies in painful backs than in those free from symptoms or in the usual run of dissecting room cadavers.

WILLIAM MCK CRAIG and MAURICE N WALSH No type of pain is absolutely pathognomonic of a occurring in the distribution of the sciatic nerve may be caused by a lesion of the spinal cord or nerve roots (especially from the fourth lumbar to the third sacral segments from which the sciatic nerve and its component nerves are derived) by affection of the lumbosacral

sacral plexus, or by lesions of the sciatic nerve itself

Pain which is more or less limited to the sciatic distribution has been observed to accompany lesions of the lumbar, thoracic, or even cervical portions of the spinal cord

Pain caused by intramedullary lesions of the spinal cord usually can be distinguished from that caused by irritation of the posterior nerve roots and ganglia

Pain of central origin referable to lesions of the spinal cord is uncommon. When it occurs, however, it may be of a peculiar, agonizing type which is sometimes described as "aching, breaking, or piercing," and which is accompanied by dysesthesia and various disagreeable sensations such as the sense of "burning" elicited by pinpricking, and "vibratory electric-light sensation" produced by thermal or tactile stimuli. There is usually marked loss in the various forms of sensation below the level of the lesion, together with hyperactivity of the tendon reflexes and the occurrence of pyramidal-tract signs below the level of the lesion. In the cervical or lumbar region there is a loss of tendon reflexes if the reflexes from the segments which mediate tendon reflexes from the extremities, such as the cervical or lumbar enlargements of the spinal cord. The pain of central lesions usually is not affected by coughing and sneezing and is rarely worse at night. There may be local tenderness to percussion at the site of the lesion.

The nerve roots forming the cauda equina arise from the lumbar and sacral regions of the spinal cord, descend in the subarachnoid space intradurally, and are freely movable except as they approach their exits, where they are fixed. Thus it is that intraspinal lesions can displace and impinge on nerve roots without causing any motor, sensory, or reflex changes, and can produce the objective symptom of pain. It is a well-known fact that the pain of caudal tumors masquerades as low-back and sciatic pain for months and years before the tumor produces any objective neurological signs, and for the same reason protruded intervertebral discs and hypertrophied ligaments can produce pressure on nerve roots without producing any symptom except pain.

Intraspinal lesions of the fourth and fifth lumbar or the first and second sacral nerve roots immediately after their emergence from the cord, during their course as part of the cauda equina, or in the neighborhood of the intervertebral foramina, commonly produce sciatic pain. Lesions involving or compressing these nerve roots give rise to the type of pain known as "radicular pain." This type of pain usually is sharp, rarely aching or burning, and is often exaggerated by coughing, sneezing, or sharp flexion of the head on the chest. It tends to be worse at night, a fact which is presumably due to elongation of the spinal column while the patient is in the supine position with resulting traction on the nerve roots. It is commonly accompanied by local tenderness

to percussion over the region of the spinal column at the level of the lesion, muscular weakness, reflex changes, or paresthesia. Sensory changes, should more than one nerve root be involved, may be found, the dermatome or dermatomes affected depending on the nerve roots which are compressed. It should be emphasized, however, that all these features need not be present to permit the diagnosis of radicular pain. In fact, it is rather rare for one patient suffering from radicular pain to demonstrate all of these characteristics.

Since the spinal cord comes to an end opposite the intervertebral disc of the first lumbar vertebra, the lumbar and sacral nerve roots which compose the sciatic nerve arise opposite the twelfth thoracic and first lumbar vertebrae. Thus, extramedullary lesions at this level may produce sciatic pain of radicular type, and this is probably the highest level at which it can be obtained. Lesions at this level however, are very likely early to involve the centers for control of the sphincter muscles, since the parasympathetic nerve supply for the urinary bladder and sphincters arises from the second and third sacral segments of the cord, and the sympathetic nerve supply arises from the second to the fifth lumbar segments, whereas the first to the third sacral segments, where control of the rectal sphincters, as well as of the genital muscular system.

Lesions of the spinal cord itself tend to produce sharply localized segmental sensory, motor, and reflex changes. This is frequently not the case when lesions involving the nerve roots in the cauda equina are present. The roots are freely movable and small lesions in the spinal canal may cause no symptoms. The lesion may involve several nerve roots, a circumstance which confuses accurate localization. The pleurisegmental nerve supply to the muscles of the lower extremities and the tendon reflexes mediated by more than one segment of the spinal cord increase the difficulty.

The patellar reflex involves the second, third, and fourth lumbar nerves and the corresponding segments in the spinal cord, the Achilles and internal hamstring reflexes, the fourth and fifth lumbar, and the first and second sacral nerves and segments, whereas the external hamstring reflex is mediated by the first, second, and third sacral nerves and segments.

The distribution in the skin of the spinal nerves forms well defined, although overlapping areas known as "dermatomes," and it is important to remember that involvement of one nerve root alone cannot be expected to produce sensory changes, and that, consequently, only those lesions which involve two or more nerve roots will produce a loss of sensation.

At present, contrast media are usually employed to localize the lesion accurately. As knowledge of the syndrome has increased, however, it has been possible to diagnose and localize more or less accurately certain instances of protrusion of the intervertebral discs, so that direct exploration was possible.

sible. Because more than 90 per cent of instances of protruded discs occur at the fourth and fifth lumbar interspaces it should be possible to predict the situation of the lesion among patients who have the typical syndrome of the protruded intervertebral disc.

In view of the present increased knowledge of the syndrome of protruded disc however it would be possible to explore the fourth and fifth lumbar interspaces directly and avoid the use of a contrast medium but the investigator should always keep in mind the fact that posterior protrusions of discs may occur rarely in the third, second or first interspace that multiple protrusions of discs may occur and that removal of only part of the cause for the patient's symptoms cannot be expected to give symptomatic relief.

The profuse supply of sensory nerve endings in the annulus fibrosus and the posterior longitudinal ligament may account for some of the heretofore unexplained painful symptoms in cases in which the compression is limited to the lower lumbar and lumbosacral regions and in which a tear of the annulus fibrosus has led to herniation of the intervertebral disc. It is possible that this observation may also explain the occasional puzzling observation of sensory changes in a dermatome higher than the level at which protrusion of the disc or the tumor found at operation occurred.

That all of the nerve reactions involved in the referred somatic manifestations of sacral disease are facilitated by the hyperirritability of the centers in the spinal cord produced by the exaggerated visceral stimulation seems probable. The degree of hyperirritability produced in the spinal cord furthermore may be a determining factor in the intensity of both the direct pain occurring in the viscera and the referred pain.

Since the joints, ligaments, muscle and tendons of the lower part of the back are subjected to unusual strain, a study of their innervation has been made with the idea of attempting to learn in which region pain referred from lesions of these structures might be expected to occur.

Various theories from the literature are presented. With few exceptions pathological proof of lesions situated in the fasciae, muscles and joints usually is lacking. It is extremely probable that referred pains from these sources do occur in the lower extremity but it is difficult to estimate their frequency. An intraspinal lesion should be eliminated before the physician concludes that the patient's pain is referred from some distant focus. Lesions of the nerve roots in the intervertebral foramina are relatively uncommon. Sacral plexus rarely produced by lesions of the lumbar plexus. It is however not infrequently produced by lesion of the sacral plexus. Lesions of the peripheral nerves may be caused by inflammatory affections of the nerves, trauma, pressure or degenerative changes and they may produce lesions which produce condensation of the head of the neuritis.

Symptoms of neuritis vary of course with the severity of the affection. In perineuritis there is an extreme amount of sharp lancinating boring pain down the course of the nerve. Chills and fever with leucocytosis and general malaise may accompany the process. The pain is severely increased by movement of the part. The nerve trunk is swollen frequently tender and palpable. The skin of the region supplied by the cutaneous nerve may be tender to pressure and show vasomotor changes. Sensory loss, motor weakness and paralysis and areflexia occur.

A study of a group of patients suffering from true sciatic pain gives the impression that the term neuralgia should no longer be used to describe this type of pain because most of such instances of pain probably are the result of neuritis of the sciatic nerve or its branches. Injuries to the peripheral nerves may produce the well known phenomenon described as causalgia. It has been suggested that causalgia might be sympathetic in origin because of the associated vasomotor disturbances and the emotional response of the individual to stimulation.

The affections of 576 of the 1000 patients used as the basis of this report were diagnosed primarily as muscular or ligamentous strains in the region of the low lumbar spine and sacrum. In 325 others a ligamentous strain was diagnosed in conjunction with disc case or deformity of the vertebrae.

J. G. KUNTS. The lumbosacral region of the spine is the weakest portion of the vertebral column. Contrasting fact is that strains at this area are abnormal. In all cases of the vertebrae and faulty habits of use of the body. Faulty body mechanics leads to impaired functioning of the muscle supports defects in balance against gravity and the tendency of the low spinal joints to be used at the limit of the extent is on.

In most instances of low back pain the lesion causing the pain is presumed to be a ligamentous tear or a separation of fibers at the musculoligamentous junction. Evidence for this assumption is found in local tenderness over the ligamentous structures. In a few instances there are superficial ecchymoses. No occlusion injection into the most tender areas often produces temporary relief. Disappearance of the pain and disability is frequent after immobilization and support with relaxation of the injured part.

In the presence of congenital anomalies and faulty body mechanics which hasten the occurrence of symptoms by causing malalignment of the spine and inefficient functioning of the supporting structures a slight trauma such as a sudden unguarded movement may produce a vertebral strain of the low back. The instability induced in the low back by the faulty body mechanics is shown in roentgenograms by the tendency of the sacrum to assume a more nearly horizontal position by the thrusting of weight coming upon the articular facets at the limit of extension on the increase in the lordosis with overriding spinous processes and by the rotation and marked downward displacement of the lower ribs.

Treatment should attempt to relieve immediate disability and do whatever is possible to avoid

recurrence. Rest with the injured structures in a position of relaxation until healing is at least partially completed is regarded as adequate treatment for the usual cause of low back disability, and this is similar to the treatment used for muscular and ligamentous tears elsewhere in the body.

It is possible to secure relaxation of most of the posterior ligamentous structures about the sacrum and lumbar spine by supine recumbency with the lumbar spine flat, and with slight flexion of the hips. The author can find no mechanical basis for traction upon the legs in extension for relief of the usual types of low-back pain.

The best method of securing immobilization and ligamentous relaxation for the low back is to keep the patient constantly on a firm bed with the entire body horizontal except for slight flexion at the hip joint. This can be secured in the supine position by placing a pillow under the knees, or in the prone position, under the abdomen. With very severe ligamentous injury it may be necessary to apply a plaster back shell or a plaster spica to hold the patient more continuously in this position temporarily.

Adequate conservative treatment should include heat applied to the injured portion of the spine, and, when movements can be performed with relative comfort, exercises to teach the patient how to use the body habitually in good body mechanics. Later, when the patient is first ambulatory, a support should be fitted with the patient's body in the best corrected posture possible, so that strain will not come upon the healing structures. The spinal support should be discarded gradually as the patient loses his pain and limitation of motion, and learns how to use the body habitually in a position which is not at the extreme of extension, but midway between full extension and flexion.

Pain referred along the sciatic nerve is relieved by such treatment in approximately 79 per cent of all patients who present this symptom.

Low back disabilities caused by ligamentous and muscular strains, acute or chronic, with or without an associated bony change, respond most frequently to conservative treatment. Manipulation may be required in a few instances to restore normal mobility. When structural restoration cannot be expected, as in metastatic malignancies, conservative therapy may prolong function and is of great help in palliative treatment. Conservative treatment is of little aid in the treatment of low back and sciatic pains caused from pressure or irritation within or about the spinal cord.

JOSEPH S. BARR and WILLIAM JASON MINTER
Posterior protrusion of one of the lumbar intervertebral discs into the spinal canal is one of the most common mechanical derangements of the low back. The leg pain is due to direct pressure of the displaced intervertebral disc tissue on one or more roots of the cauda equina. In addition to this lesion, there may be found associated thickening of the ligamentum flavum, chronic adhesive arachnoiditis, hypermobility

of the involved vertebrae, and edema of the involved nerve roots. Although the etiology of posterior disc protrusions is not perfectly clear, trauma alone or in combination seems to be the usual causes of posterior protrusion.

Among the most common and characteristic symptoms and signs, are intractable sciatic pain following a lifting injury, accompanied by limitation of back motion and of straight-leg raising, sciatic scoliosis, and lumbar kyphosis, tenderness over the lower lumbar spinous processes, and absence of the ankle jerk. The total protein of the spinal fluid is usually elevated. There are no changes on the routine roentgenograms characteristic of ruptured intervertebral discs, but narrowing of the fourth lumbar disc is of some importance if the clinical picture is characteristic. Lipiodol examination is highly accurate in making the correct diagnosis and in localization of the lesion, but because of the potential danger, the use of lipiodol should be reserved for cases in which surgery is necessary. In a series of 155 cases of proved intervertebral-disc protrusion into the spinal canal, verified by operation at the Massachusetts General Hospital, 139 (90 per cent) occurred in the lumbar region, the fourth and fifth lumbar discs being the ones involved. The lesion is laterally placed, usually directly beneath the articular facet, and, when of sufficient size, the nerve root between the ruptured disc and the facet just before its exit through the intervertebral foramen are compressed. A lesion at the fourth lumbar disc invariably compresses the first sacral root, provided the protrusions are of sufficient size to cause nerve-root pressure. This is due to the fixation of the root in its dural sheath at its point of exit through the intervertebral foramen. A satisfactory method for removal of lipiodol is now available (A. O. Hampton and C. S. Kubik). This makes it unnecessary to operate on those cases that have had negative lipiodol examinations and obviates the danger of late arachnoiditis due to irritation from the retained lipiodol. Pneumomyelography and clinical localization of the lesion may make the use of lipiodol necessary in not more than one-half the cases. Conservative treatment should be tried in every case of suspected protrusion of the intervertebral disc unless there is obvious serious nerve-root pressure, as shown by objective sensory or motor disturbance. Bed rest and immobilization of the lumbar spine in a plaster jacket seem to be the most effective means of conservative treatment.

Surgical treatment consists in the removal of the ruptured disc fragment through as small a laminectomy incision as possible. Spine fusion at the time of the laminectomy seems to give definitely better results than laminectomy alone. A modified Hibbs method which reinforces the fusion with an osteoperiosteal graft and additional bone chips from the tibia is used. No attempt is made to bridge the laminectomy defect. There is a definite place for fusion in selected cases, and about one-third of this series of cases were fused. Whether fusion is performed or

not strenuous activity and heavy work are not permitted for six months after operation. It is unnecessary to emphasize that muscular rehabilitation by means of carefully graded exercises should be an integral part of the postoperative care of every patient. Details of the after care vary with the physician in charge. Manipulation of the spine in cases in which disc involvement is suspected is strongly condemned. It may result in paraplegia.

Of 64 patients with proved ruptured intervertebral disc followed up for at least one year after operation 77 per cent had complete relief from sciatic pain and an additional 18 per cent had only minor leg pain. There were 2 proved cases of recurrent ruptures in this series.

The relief of back symptoms was not as satisfactory as the relief of the radiating leg pain. Seventy-three per cent of the patients in whom the spine was fused and 52 per cent of the patients without fusion had no back symptoms. The rest had complaints of backache or weakness of varying severity. In a small series in which insurance compensation was involved 45 per cent of the patients were returned to their original occupation.

BENJAMIN P. FARRELL and WILLIAM B. MAC CRACKEN. The diagnosis of protruding intervertebral disc is not one easily made. Clinical examination, spinal puncture, roentgenograms and a myelogram have in the authors' hands been ineffectual in establishing an accurate diagnosis. Furthermore, spine fusion alone has accomplished in many cases which were clinically indistinguishable from cases of protruding disc as good results as laminectomy and as spine fusion with the removal of the disc protrusion. Theoretically, the majority, if not all, of the cases of protruding intervertebral disc can be relieved by fusion alone.

Of 33 laminectomies 3 showed no pathology. The other 30 cases included 10 of protrusion of the intervertebral disc, 5 of hypertrophy of the ligamentum flavum, 1 case of extradural scarring, 1 of varicosity along a nerve root, 2 cases of neurinoma, and 11 of adhesive arachnoiditis. Four cases of protruding disc and 2 of hypertrophy of the ligamentum flavum had arachnoid adhesions as well.

This variety of conditions not specifically diagnosed before operation is evidence of the difficulty of accurate clinical diagnosis of intraspinal lesions. In most of these conditions spinal puncture with manometric and total protein determinations is of very doubtful differential value.

There may very well be cases of true compression of the nerve roots by protruding intervertebral discs and certainly sciatic pain is occasionally associated with new growths within the spinal canal, but the greatest number of the authors' laminectomies revealed arachnoid adhesions between the nerve roots or a disc protrusion small enough to allow adequate passage of the nerve root. They found only one large herniation 1.5 by 1.5 by 1 cm. which was apparently causing considerable compression of the nerve root.

It has not been proved that a disc protrusion which merely angulates one or more nerve roots can cause symptoms in the absence of motion. Certainly the nerve roots are normally angulated about many structures in their normal course and the spinal cord itself is often severely angulated at a tuberculous kyphosis without producing any nerve symptoms.

Radicular pain resulting from a fractured vertebra or arthritic lipping with pressure on the nerve roots has long been known to be amenable to immobilization by bed rest or spontaneous or surgical fusion.

If the small disc protrusion causes nerve root symptoms it is much more reasonable to believe they do so by repeated sliding of the nerve over this protrusion with spine motions than that they actually compress a nerve which is free to move away from the protrusion.

It is even more reasonable to believe that the small disc protrusion may often be an inconsequential element of a grossly unstable mechanical system. The stability of the lumbosacral joint depends not entirely on any one feature of its structure but upon the composite of several elements and their relationship. The nature of the arch articulations, the angle of the superior surface of the sacrum, the presence or absence of impinging spinous processes and of anomalies such as partial sacralization of the fifth lumbar vertebra as well as degenerative changes must all be considered. A small disc protrusion occurring in 15 per cent of Beadles' series of spines would seem to be merely another factor to be considered in relation to the others.

In a study of 175 cases treated by lumbosacral fusion for typical sciatic pain 46 patients had some or all of the abnormal neurologic findings now commonly attributed to protrusion of an intervertebral disc. It has been possible to see 27 of these patients for this study and they have been compared with 21 of those who had had laminectomy fusions.

The results in the group with spine fusions were almost the same as the results in the group with laminectomy fusions.

TABLE I. RESULTS OF OPERATIVE TREATMENT FOR SCIATIC PAIN

Treatment	Cases	After R. I. f. (Per Cent)	Per Cent
Fusion	7	85	83
Laminectomy	7	84	87

Five patients have had laminectomy followed by fusion. Of these 1 had a protrusion of the intervertebral disc above the fusion, 2 had arachnoid adhesions and 1 had extradural scarring. The first had a laminectomy in spite of a pseudarthrosis of the original spine fusion because the neurological signs were not thought to be attributable to the pseudarthrosis alone. No intraspinal pathology was found in this case. In these 5 cases there was none with any appreciable improvement following laminectomy.

The authors submit that the need for laminectomy in treating protruding intervertebral disc has been

been established. They present presumptive evidence that spine fusion alone is as effective as laminectomy and fusion, and suggest that fusion alone, a theoretically sound procedure, may be the treatment of choice.

HENRI W. MEYERDING. In the past two years the author has been impressed by the number of cases in which the patient had spondylolisthesis associated with sciatic pain and protrusion of an intervertebral disc. Protrusion of an intervertebral disc was diagnosed in 15 of the 25 cases in which spondylolisthesis was associated with sciatica, and the diagnosis was confirmed in 6 cases in which operation was performed.

The author believes that patients afflicted with spondylolisthesis are more likely to have protrusion of an intervertebral disc than are those who have a more stable spinal column. Trauma is a definite factor in this condition.

Marked displacements in spondylolisthesis are accompanied by fewer complaints, than are the lesser grades, which indicates that there may be some factor other than spondylolisthesis involved in the production of the sciatic pain.

A thorough neurological investigation, including spinograms, is now a routine procedure for those patients with sciatic pain for whom the diagnosis of spondylolisthesis has been made. This is especially emphasized for those who have diminution or loss of the Achilles reflex, with pain, numbness, or paresis.

The neural arch remains behind and, although the cauda equina and roots may be slightly stretched, there is enough room, in the large spinal canal, to prevent direct pressure on the cauda equina. In patients with the congenital types of spondylolisthesis, and in those in whom development was slow, there is rarely any paralysis, because nature compensates for stretch and pull. In the cases in which the injury is acute and severe, with fracture or rotation of a vertebra or vertebrae, it is obvious that evulsion of nerve roots, pressure of bone fragments, hematomas, and paralysis of the caudal segments may occur. Thus, it would seem that the common symptoms of spondylolisthesis, such as backache, pain, and paresthesia referred to the buttocks and legs, are the results of instability of the lower portion of the spinal column with subsequent irritation and strain, rather than the results of direct pressure. The protruded disc, on the other hand, may cause direct pressure on the nerve roots. When the protrusion occurs in the center, bilateral distribution of pain may result, but when the protrusion is to the side, pain arises from the corresponding nerve-root distribution and sciatica results.

It is Meyerding's opinion that fusion of the lumbosacral region is desirable in those cases of spondylolisthesis with symptoms of protruded disc in which the surgeon is unable to demonstrate the disc at the time of the operation. This fixation of the spinal column will prevent movement and slipping, and is the most certain method of preventing additional

symptoms of backache and sciatic pain. The treatment which offers the greatest benefit, the shortest period of disability, and the longest period of relief is surgical removal of the protruded disc and fusion of the last three lumbar vertebrae with the sacrum.

Patients have been seen for whom all means of combating the backache and sciatic pain have failed and for whom conservative measures have been instituted without relief, and the author is, therefore, firmly convinced that such measures are of little permanent value. In spite of accurate diagnosis and explanation as to the cause of a patient's disability, there will always be those who refuse surgical treatment and who will have to be treated conservatively. The persistent wearing of the lumbosacral corset with reinforced steel stays, and local applications of heat are, when combined with medication, perhaps the most efficient non-surgical measures. In the present series of 80 patients who had spondylolisthesis associated with sciatic pain, conservative measures were carried out for 49, or 61.3 per cent, surgical fusion was performed for 25, or 31.3 per cent, and a protruded disc was removed for 6, or 7.5 per cent.

To insure relief of the sciatic pain and backache associated with spondylolisthesis, treatment must consist of immobilization of the lumbosacral region and relief of the intraspinal pressure. Insertion of bone grafts alone in an attempt to relieve sciatic pain in such cases is not considered sufficient. Removal of the protruded disc combined with the added safeguard of lumbosacral fusion is the method of choice. There is no doubt that some of the patients may obtain a measure of relief from surgical fusion alone.

Should there be considerable defect in the lamina, following the removal of the disc, the surgeon may use a graft of periosteum, sutured so that it covers the defect. To insure a strong bony support, two grafts are usually inserted, together with numerous fragments and cancellous bone that have been removed with a curette from the upper end of the tibia. The sides of the spinous processes, lamina, and facets are further roughened with a chisel or curette to insure bony approximation and ultimate fusion. The region which is usually fused consists of the third, fourth, and fifth lumbar, and the first two sacral vertebrae. The resultant mass of bone is the most secure fixation of the lumbosacral region that the author has been able to devise, and results from an application, with modifications, of the principles of fusion brought out by Albee and Hibbs.

FRANK R. OBER. Fasciotomy for the relief of demonstrable fascial contracture of the thigh has its place in the treatment of chronic lame backs and sciatic pain. Fasciotomy is now being performed quite extensively, and many surgeons have a better record of results than the writer. It should not be done indiscriminately for all sciatic pain, because there are often lesions of the back, of the sciatic nerve, or within the spinal canal which cause pain in the sciatic nerve. The abduction test was positive in every one of these patients and almost always present on

both sides. In several instances in which the test was positive on each side and a unilateral fasciotomy for sciatic pain had been performed without relief, a lateral fasciotomy on the opposite side gave complete relief. It is to be remembered that conservative measures will still relieve a large proportion of these patients and should be tried faithfully.

The operation will if properly performed relieve a large number of cases of sciatic pain. In some instances there is early relief of the lame back condition when associated with sciatic pain. It has been found that the relief of low back pain, stiffness and the associated poor posture is often slow. This is probably due either to the fact that the inflammatory condition is slow in clearing up or that the physiological curves having been distorted for years by the bad mechanics of abnormal fascial pulls on the pelvis and low spine do not return to a normal posture quickly. In addition the spinal curves in returning to a normal posture must exert pressure and tension on muscles, fascia and ligaments which have not been subjected to normal conditions for years.

The operation is now performed as follows:

An oblique incision from 4 to 6 in. long is made from the lower edge of the anterior superior spine downward and backward to a point just above the level of the greater trochanter and just posterior to it. The skin and subcutaneous fascia are separated by clean dissection above, below and posteriorly until a strip about 2 in. in width has been dissected well back over the anterior surface of the gluteus maximus muscle. The fascia is now divided from the anterior superior spine well back over this muscle. The fascia gaps at the incision and the flaps are dissected off the muscles for about 1 in. on each side. All intermuscular septa are divided. If there is a positive Ely's sign the fascia surrounding the sartorius muscle is also divided. All loose tags of fascial tissue must be removed. The length of postoperative time in bed depends on the severity of the back symptoms and the rapidity with which the sciatic pain clears up.

There were a small number of patients who had sciatica later on in the opposite side and these insisted on having the operation on the second side. One of these patients had had recurrent sciatic pain for ten years and operation stopped his pain within a month. Four years later he had sciatica in the opposite leg for two or three weeks and insisted on the same procedure for that side. There was complete relief within three weeks.

There have been only a few cases with recurrence and these have usually been slight and of temporary duration and responded to conservative treatment.

Of the 86 cases 41 have shown excellent results, 33 improvement, 5 only slight improvement and 5 no improvement. There is no record in 2 cases.

CLARENCE H. HEYMAN. One no longer need hesitate in accepting a lesion of musculo-aponeurotic and ligamentous origin as a primary source of irritation and the origin of low back pain. Slocumb tentatively

classifies two types: a primary and a secondary. The primary type is unaccompanied by and independent of any other definite disease and is presumably attributable to undetected infections or toxemia. The secondary type is secondary to arthritis, trauma or influenza.

Symptoms of fibrositis are muscular tenderness, stiffness, tenderness over eruptions, particularly when the part is put on a stretch. Pain may be accompanied or replaced by a referred pain felt in the area of the skin corresponding to the nerve root which conducts the afferent impulse and tenderness to deep pressure in the muscles in the same segmental area.

Since posterior stripping has relieved carefully selected cases of low back pain or sciatica, one must conclude that the source of irritation lay in a superficial focus in ligaments, fasciae, muscles, aponeuroses or at their periosteal attachments. It is difficult to conceive that the operation corrects sacro-iliac or lumbosacral strain or relieves a direct irritation upon the components of the sciatic nerve. It then becomes necessary to assume that there is a so-called fibrositis which would appear to be the weak point of this argument because there is no convincing proof that fibrositis is a pathological entity. Clinical evidence, however, appears so convincing that it deserves a place as one of the three most common forms of rheumatic disease—ostrophic arthritis, hypertrophic arthritis and fibrositis. Fibrositis is a provisionally accepted entity causing low back and sciatic pain which may be relieved by posterior fasciotomy in selected cases not yielding to conservative treatment.

There is no reliable single test or sign for the type of extra-articular origin of pain. The criteria for posterior fasciotomy depends upon the following factors:

Operation reserved for the chronic case in which persistent symptoms or tension is not relieved by conservative treatment. Hence only comparatively few of this large group of cases are suitable for operation. There must be localized tenderness at the musculo-aponeurotic or ligamentous insertions. However, there may be pain and tenderness along the segmental distribution that is sciatic. Generally there must be tension pain on stretching or active contraction against resistance. Passive relaxation is not painful, therefore passive extension of the lumbar spine must be free and without pain. A positive response if temporary relief following a local and not massive injection of procaine should be sought before proceeding with the operation. A coexisting and asymptomatic hypertrophic arthritis of moderate degree is relieved only by the roentgenogram is not a contraindication to fasciotomy. Fibrositis may be secondary and only a part of the entire picture of arthritis but still be the sole cause of symptoms.

The purpose of operation is to release tensions in the ligaments, fascia and muscles attached to the posterior superior spine and the posterior third of the crest of the ilium. This includes the sub-

stripping laterally, medially, and inferiorly, together with division of the sacrospinalis fascia when tenderness or pain is present there.

The proposal to cut the piriformis muscle for the relief of sciatic pain was originally put forth with the idea that this might be welcome as a symptomatic release in certain cases which had failed to yield to non-operative methods. While the possibility of dissection primarily situated in the muscle itself was granted, the operation was done in the absence of definite evidence of its existence. Muscle contraction of continuing character is most often secondary to a lesion situated elsewhere primarily. When the lesion is primary in the muscle or fascia, it is conceived to be the result of inflammatory disease—myofascitis or fibrositis. In no instance in which microscopic study of excised piriformis tissue was made was there a report of local disease. In the absence of this it is concluded that the role of the muscle in producing sciatic pain is secondary. The same thing will have to be said in the case of operation on other muscular or fascial tissue. Unless there is tangible evidence of disease in the tissue itself or in the dominant nerve control, a merely symptomatic release is unsatisfactory. The primary lesion will have to be recognized and subjected to suitable treatment. Such recognition often makes an operation of any kind unnecessary. Here, for the time being, at least, the case must rest.

ALBERT H. FREIBERG Successful results have been observed by Freiberg in a limited number of cases treated by the methods of Heyman, Ober, or Steindler. These methods have been employed when it was thought that they were indicated, but in numbers too small to be worthy of statistical report. Like the explanation offered for the results of the piriformis operation, however, their explanation is one of rationalization rather than of proof. It would appear that the establishment of indications for the various procedures must rest largely upon such explanation, or upon a basis which is personal and empirical. Once surgical intervention seems called for, however, it will have to be acknowledged that in other operations an attack is being made upon structures much less directly connected with the sciatic trunk than is the piriformis muscle. Here we are at least concerned with a structure which is always in direct contact with the sciatic nerve, even though not always to the same extent or in precisely the same way.

CARL E. BADGLEY The anatomical possibilities for the articular facets to play a more or less active part in the production of low back pain with or without sciatic radiation are obvious, but pathological evidence is not yet sufficient to make this conclusion a fact.

Sciatica is a condition in which the syndrome is the only constant factor, the causative factors are variable and may be single or multiple, but the role of the facets should be considered in every case. It is important to recognize that the articulations formed by the vertebral articular processes are true

joints provided with a complete capsule which is lined with a definite synovial tissue. Closely associated with the mesial aspect of the capsule are the ligamenta flava.

Brailsford, in a review of 3,000 roentgenographic studies of the lumbosacral spine, found that 57 per cent of the lumbosacral facets pointed backward, 12 per cent pointed inward, and 31 per cent were mixed or asymmetrical.

Goldthwait pointed out that if the facets were asymmetrical, the movements were irregular. Von Lackum, in an anatomical study of 30 cadavers with 18 grossly asymmetrical lumbosacral facets, states that when the articulations are asymmetrical they result in unequal rotation, a factor that also contributes to the weakness of the part. When there is associated with this condition a poor muscular or ligamentous development, or when there is a settling down of the superior facets onto the inferior facets from any cause, a very potent reason for disability or abnormality is established. Rotation of the lumbar, and particularly of the lumbosacral articulation, occurs to a greater extent than anatomists have recognized. In this region it takes place chiefly in the facets, instead of in the intervertebral discs as it does in rotation in the thoracic region.

Willis has pointed out that developmental variations of the articular processes in size, shape, and angle of projection occur particularly in the lumbosacral region. He also states that poorly developed and asymmetricaly formed articular processes strongly suggest mechanical instability and susceptibility to ligamentous injury.

Not infrequently there is an asymmetrical development of the articular portion of the facets on the corresponding sides, with a difference in size as great as 6 to 8 mm in the transverse diameter. It is probable that the fissure formations, usually in the interior articular facet, are the result of anomalous development. Fracture may occur, but it is usually found only with evidence of fracture elsewhere in the spine. Putti also found evidence in the articulation of the facet of synovial villi which were extremely variable in shape, size, and appearance, frequently having two lobes, sometimes the size of the head of a large pin, sometimes leaf-shaped. They are rich in blood vessels.

Badgley has previously presented his theory of postaxial radiation as referred pain, not necessarily produced by direct nerve irritation. The excellent response to conservative treatment in the cases without neurological signs, verifies his contention that 80 per cent of the cases of low back pain with sciatic radiation are on the basis of referred pain, and not direct nerve irritation.

The sensory nerve supply of the capsule of the facets is sufficiently well determined to support the conception that irritation of the capsule of the lumbar articular facets could well produce pain stimuli which could return to the central nervous system through the primary posterior division and produce referred pain through the dermatomes of the in-

volved nerves. The last correspond exactly with the pathway of sciatic radiation, namely the fourth and fifth nerves. Thus sciatic symptoms on a referred mechanism but along the same pathway as direct nerve irritation can conceivably be produced.

Putti for years maintained that sciatica is a neuralgia caused by a pathological condition of the intervertebral foramina and especially of the intervertebral articulations of the articular facets. He said if opathic sciatica is essentially the result of vertebral arthritis involving chiefly the articular facets.

Arthritis of the facets is rare under thirty years of age but is progressively more frequent and severe with age. Intervertebral arthritis is more common between the third and fourth and fourth and fifth lumbar vertebrae and a little less common surprisingly enough in the lumbosacral region itself. Arthritis of the facet is more commonly associated with the asymmetrical facets. Lesions of the articular capsules were found in 57 of the 75 cases appearing usually in the upper and mesial part of the capsule with edema granular ossification calcification and adhesions between the capsule and the meningeal covering of the nerve root adjacent to it.

A mechanically unsound joint in the hip or elsewhere shows reaction to irritation as the patient ages and so must the asymmetrical and mechanically poor facets. From Putti's studies he concluded that arthritis of the articular facets is the rule in practically all patients over forty years of age. The frequency of arthritis in the facets as age progresses and the frequency of low back disturbances in similar age periods are coincidental facts of very probable significance. ROBERT P. MONTGOMERY, M.D.

Stauffer H. M., Arbuckle R. K. and Aegert E. E. Polyostotic Fibrous Dysplasia with Cutaneous Pigmentation and Congenital Arteriovenous Aneurysms. *J. Bone & Jt. Surg.* 1942, 23: 323.

Polyostotic fibrous dysplasia is a term proposed by Lichtenstein for a type of fibrous dystrophy involving multiple bones. It appears to be a clinical entity and is characterized by unilateral bone lesions with deformities, pain and lumping. Pathological fractures with malunion are common. The long bones of the leg and arm are usually involved by progressive lesions which eventually become static. Roentgenographically the shaft is expanded with an irregular porosity and apparent trabeculation often resembling cysts. The cortex is markedly thinned. Chemical studies reveal normal values for serum calcium and phosphorus. Elevation of serum phosphatase is frequent. The pathology is a replacement of cancellous bone and marrow by avascular fibrous tissue without evidence of inflammatory or neoplastic changes, the microscopic picture being similar to that found in osteitis fibrosa cystica. The cause of the disease is probably a unilateral congenital disorder of the bone-forming mesenchyma. Its correct differential diagnosis from hyperparathyroidism may prevent an unnecessary operation in the endocrine glands.

The authors report a thoroughly studied case of this disease associated with cutaneous pigmentation and arteriovenous communications on the same side of the body. CHESTER C. GOV, M.D.

Axelrad L. D. Changes in the Spine Following Tetanus. *Ann. Surg.* 1942, 48: 183.

The author collected from the literature reports of 36 writers describing 100 cases with pathological changes of the spine following tetanus and he adds a case of his own.

The gravity of changes in the vertebral column has no relation to the age of the patients. In all cases reported only the thoracic spine was involved. Lesions of the fourth to seventh thoracic vertebrae dominated those of the third, eighth and ninth vertebrae were less frequent while the tenth vertebra was affected only in exceptional cases. As a rule a compression fracture with a wedge-shaped deformity was present. Arches and processes were not fractured. In a limited number of cases a compression of the intervertebral disks was discovered and in a few instances the nucleus pulposus was pushed deeply into the body of the vertebra.

Sometimes a deformity of the vertebral column may appear relatively late after tetanus and the therefore repeated roentgenographic examinations of the entire spine in the course of one to two years are advisable. The character of the fractures is not peculiar for tetanus. Convulsions may be responsible for more or less pronounced fractures which later on may lead to wedge-shaped deformities and therefore influence of the body weight. Similar late changes in the vertebral column following an acute trauma have been described by Kuemmel. Traumatic deformities may affect either normal vertebrae or those with trophoneuritic or metabolic changes. Pathologico-anatomical studies on persons who died from tetanus disclose degenerative changes of internal organs. Therefore it can be assumed that identical changes take place also in the spinal column.

JOSEPH K. NATA, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Grasso R. Spontaneous Eruption of Acute Hematogenous Osteomyelitis and Its Effect on Treatment: Minimal and Delayed Intervention. (*Chirurgia, Orthopaedia et Radiologia*) *Chirurgia* 1942, 48: 183.

Until a few years ago the diagnosis of acute hematogenous osteomyelitis was the signal for immediate intervention and this aggressive, urgent treatment was lately perfected and completed by the use of vaselined drainage, postoperative immobilization and rare medications. However, the results of early surgical treatment were unsatisfactory. The supporters of the expectant method claim that acute hematogenous osteomyelitis is only a complication

affected bone. For instance with a thigh of 47 1/4 cm this means 4 3/4 cm. If the shortening exceeds 5 cm this procedure cannot be used. In addition the treatment is of long duration requiring at least nine months and sometimes as much as two years. Also it is difficult to predict the exact length obtainable and finally the operation itself is difficult.

The author therefore believes that the best method of treatment is operative shortening of the sound leg. The femur can be shortened to one fourth of its original length (12 cm if it is 47 1/4 cm long) if necessary. Operation on the sound leg is simple and healing takes place in about three months. Furthermore the author believes that a better functional condition will result in the diseased limb because atrophied muscles and joints are brought into play more physiologically after the sound limb is shortened. He recommends a medullary graft to secure union after shortening.

The best age for the operation is between fourteen and eighteen years. If one operates before fourteen years the affected limb might grow again and if after eighteen years healing requires a longer time. However the author operated upon a woman of twenty-one and one of twenty-three years of age the former with a shortening of 10 cm from infantile paralysis and the latter with a congenital shortening of 5 cm. Good results were obtained in both but they were especially striking in the case with the shortening of 10 cm since the patient was relieved of heavy orthopedic apparatus.

The author has used this procedure in more than 52 cases and recommends it highly.

(RICHTER) HAWTHORNE C WALLACE MD

Hoont A R and Shackelford R T. Comparative Results in the Use of Living and Preserved Fascia as Suture Material in Bone. Surg 194 9 493

The authors performed 28 experiments on dogs in which both living and preserved fascia was transplanted into bone in different ways in order to show the fate of both types of fascia and to note any differences that might occur in the fate of the two types. In a few instances the fascia strips (both types) were transplanted in such a manner that they had no function to perform but in most instances they were given the function of holding separated bone fragments together.

From this work the authors have drawn the following conclusions:

Good results were obtained in suturing fractures of the olecranon in dogs with both living and alcohol preserved fascia strips provided the part were properly immobilized. No distinction could be made between the results obtained from the two types of fascia used either functionally or in so far as shown by gross microscopic and x-ray examination.

Ossification of both types of fascia by replacement of fascia by growing bone occurred a union of the fragment as accomplished. In cases in which immobilization was incomplete but fibrous union

occurred both types of fascia were found intact months after implantation. When fascia (both living and preserved) was implanted in bone with no function to perform rapid absorption took place.

SAMUEL H FLEURY MD

FRACTURES AND DISLOCATIONS

Grevillius A. So Called Insufficiency Fractures (Ubenannt Insuffizienzfrakturen). Dtsch Wochenschr 194 94 p 2465

A fracture due to insufficiency of the bone structure (Aleman) that is failure of the otherwise apparently normal bony structure to bear weight also called exhaustion fracture, chronic fracture or pseudofracture is a type explained on the basis of a gradual breaking of the bone resulting from exhaustion of the bony structure following repeated strains of a certain typical mechanism. This type of fracture appears most commonly as the so-called march fracture (March fracture or Marschgesschwulst) of the metatarsal bones. Periostitis of the upper part of the tibia occurring in young soldiers according to Aleman is related to this type of fracture. Aleman regards the periostitis as the first stage of a fracture although he never saw a fracture line in these cases. The spontaneous fractures caused by severe destruction of the bone or degeneration and the so-called avulsion fractures caused by a sudden unusually strong contraction of the muscle do not belong to this group.

In the case of an insufficiency fracture the patient is not able to associate a definite accident which would be responsible for the fracture nor can he determine the exact moment of the occurrence of the fracture because the pathological condition in question develops gradually on the basis of a bone transformation. Lack of resorption and necrosis destroy the regular structure of the bone which is subsequently substituted by a tissue resembling poorly calcified callous tissue. In most cases no interruption of the continuity of the bone occurs. Healing takes place by gradually increasing calcification. The final causes of the insufficiency fracture are said to be endogenous (endogenous) and disease of the skeleton (osteomyelitis) or mechanical (trauma). The endogenous factor may affect the mineral constituents of the bone while the latter mechanical is understood to involve and destroy the microcrystals of the bony tissue. The fracture takes place especially in these spots which are more or less anatomically weak for example the upper part of the tibia where the resistance of the bone is insufficient to withstand particularly hard strain such as continuous goose stepping—especially in persons of poor condition and without training. The diagnosis is easy when the history discloses severe exertion followed by steadily increasing pain and swelling of the bone involved. However when these symptoms are less pronounced the diagnosis is quite difficult despite roentgen-ray examination which by no means reveals a fracture line in every

The differential diagnosis from a malignant tumor is often impossible, as the history of a twelve-year-old boy proves. Within one and one-half months an enlargement with gradually increasing pain developed in the upper part of the right tibia. The skin covering the tumor was normal. Two roentgen-ray examinations taken at intervals revealed a spindle-shaped thickening of the periosteum 4 mm wide, but did not permit a proper diagnosis. Ewing's sarcoma was suspected. Preliminary roentgenotherapy with anticipation of a possible subsequent amputation of the leg was administered. Roentgenograms taken four weeks later proved the suspicion of a malignancy unfounded. The film demonstrated a complete fracture line. A cast was applied, and after three weeks the patient was discharged with the leg perfectly healed. Films taken a year later demonstrated no further pathology of the bone structure.

A boy four years old complained of pain in the upper part of the tibia with onset one week prior to the examination. The affected area was slightly thickened. The first roentgenogram made one suspicious of a fracture line; this became clearly demonstrated in the films taken two weeks later. Quick healing occurred.

The author described a third case. A soldier suffered from perostitis of a metatarsal bone due to military exercises (Marschgeschwulst). The clinical picture was outspoken, the periosteal thickening was very marked. Repeated roentgen examinations were made, all of which failed to demonstrate a clear fracture line.

As to the question of compensation, the author agrees with the viewpoint of Troell who considers cases of "insufficiency fracture" as compensable as any actual accident, provided they developed during work, even though specific signs of an accident might be absent. To be sure, the author makes the reservation that only a few days shall have elapsed before the noxious mechanism culminates in a fracture.

(RICHTER) JEROME G FINDER, M D

Pollock, G A, and Ghormley, R K. Early Repair of Bone, An Experimental Study of Certain Factors. *J Bone & Joint Surg*, 1941, 23 273

Twenty one mature female rats, each five months of age and weighing about 200 gm., were used. The right humerus of each rat was fractured, under anesthesia, at the junction of the middle and lower thirds. Group A consisted of 7 normal rats in which the humerus was fractured. Group B consisted of 7 rats which had been spared two months previously. The rats of Group C corresponded in all details to those of Group B except that each rat received 2,000 international units of estrogenic substance on the second, fourth, and sixth days after the humerus was fractured.

Sealing of the medullary cavity appears to be one of the first steps in the healing of fracture. This may be produced by (1) a strand of periosteum, (2) a band of fibrin, or (3) a fibrous like plug produced

by mass destruction of the red corpuscles. The seal is continuous across the cortex with the periosteum and later becomes infiltrated with fibrous-tissue cells from this membrane. In other cases, however, these cells may arise from the marrow or develop directly from the lymphocytes caught in meshes of this fibrous medullary cap.

By the second day, the periosteum from the site of fracture to the neck of the humerus is thickened. This would appear to be the result of a general stimulation rather than that caused by local trauma. By the third day, osteoid tissue has developed subperiosteally in regions well removed from the fracture. At the same time, osteoid tissue has also made its appearance at the fractured ends of the bone where it has arisen from the endosteum and in conjunction with the original fibrous plug formed a more efficient seal for the medullary cavity. The development of this subperiosteal bone along the entire shaft was considered one of the most interesting features of this study.

It was not possible to demonstrate any appreciable difference in the early stages of repair of bone in the three groups, but the impression was gained that injections of estrogenic substance stimulated the production of endosteal osteoid tissue. The insertion into the medullary cavity of a small plug of dense cortical bone as occurred in 1 of the cases could predispose to non-union.

Urist, M R, and McLean, F C. Calcification and Ossification. Control of Calcification in the Fracture Callus in Rachitic Rats. *J Bone & Joint Surg*, 1941, 23 283

The primary object of the experiments reported in this article was to make the process of calcification and its relationship to the repair of bone accessible to analysis. The discussion is limited to these aspects of the subject, the other essential findings reported are included in the summary and conclusions. The author discusses healing of fractures in untreated florid rickets, the initiation of calcification in the callus by the administration of a single dose of phosphate, the control of calcification by the continuous administration of phosphate, calcification following the administration of vitamin D, and the relationship between the state of the body mineral stores and the progress of calcification in the callus of healing fractures.

In the condition of florid rickets relatively free from phosphorus deficiencies, the fracture callus in rats remained completely devoid of bone salts for a period of from ten to fifteen days. During this period the influence of absence of calcification upon the healing of fractures and the effects of the initiation of calcification could be observed directly. At the end of this period, calcification of the callus began spontaneously, without simultaneous calcification in the epiphyseal cartilage and the rachitic metaphysis. Given an adequate supply of bone minerals, calcification of the matrix of hypertrophic cartilage and of osseous tissue occurred promptly.

and decisi ely Osteogenesis and calcification could not be separated in the normal animal so that it was impossible from the study of the normal animal alone to determine how much the healing process itself was influenced by the deposition of bone salts in the matrix of cartilage and bone. These inter relationships have however been clearly demonstrated in the experiments and the observation reported.

The healing process in the fractures produced in rachitic rats began in the same way as in normal rats and the formation of the fibrocartilaginous cartilage and the production of subperiosteal and endosteal osseous tissue proceeded just as in the normal animal. However in the absence of calcification after the fourth or fifth day following the injury a difference appeared which was clearly dependent upon the absence of calcification in the new tissues formed in the rachitic rat and those formed in the normal rat subjected to the same procedure. These differences are discussed but it was difficult to determine to what extent they might be overcome in the complete absence of calcification and just as there was a lag in the healing process in the absence of calcification so was there a lag in response to calcification in the spontaneous or induced process. The authors believe that the initiation of the healing of fractures in the rat was not materially affected by dietary factors which prevent calcification but that in the absence of calcification the healing process was both retarded and transformed into a rachitic type of response. Moreover when conditions for calcification were restored there was a delay in restoration of the normal healing process because of encapsulation of the callus cartilage in a dense mass of connective tissue. Thus even a temporary failure of calcification may materially retard the subsequent union of fractures.

Attention has been called to the rôle of the body mineral stores as a source of calcium salts which may be mobilized in the emergency of a healing fracture. This has been shown in adult animals in which the growth is nearly static and the bone mineral stores are nearly maximum by the removal of phosphorus from the diet. After a period long enough to present a condition of phosphorus deficiency without complete failure in the calcification mechanism it was possible to show that the callus of a healing fracture received bone mineral elements mobilized from the readily available body stores and solid union could occur in the normal time with no other source of phosphorus. In an adult rat with a well developed skeleton it should not be necessary to supplement the diet with mineral solely for the purpose of enforcing the structure of the uniting fracture but in individual with multiple fractures and in the very young in whom the rapidly growing bone tissue everywhere in the body demands a continuous supply of mineral measures which keep the mineral metabolism at its highest level are indicated from the earliest period after a fracture occurs.

Earl C. Roberts, M.D.

Bogomoletz O. A. The Treatment of Fractures with Stimulating Doses of Anti Reticular Cytotoxic Serum. *Vorh. d. dtsch. Chir. Ges.* 1941 45: 122

All cellular formations taking an active part in bone formation belong to the physiol. group of connective tissue. It follows that the course and character of repair of a fracture depends on the reactivity and regenerative properties of these structures. In the presence of identical mechanical conditions the rapidity of formation and functional quality of the callus are determined by a biological factor namely the reactivity of osteogenic cells of the connective tissue.

A. A. Bogomoletz found that small doses of anti-reticular cytotoxic serum have a stimulating effect on the whole group of connective tissue while larger doses display an inhibiting effect on the functions of mesenchymal formations. The author of this paper found that with a selection of proper serum doses the regenerative process in osseous tissues may be retarded or accelerated. Non union follows an intravenous injection of 0.025 ccm of the serum after an application of from 0.001 to 0.002 ccm of the serum the reparative processes are greatly accelerated and a fully ossified callus develops more rapidly than in control cases.

The author experimented on rabbits using anti-reticular cytotoxic sheep serum as control he employed serum of normal non immunized sheep. The specific effect of the cytotoxic serum was clearly demonstrated both in blockage and stimulation of the healing of fractures.

In 28 of 72 patients who received subcutaneous injections of the serum a marked effect was recorded a less pronounced effect in 4 and failure in 2. The last 2 patients mentioned were suffering from an inveterate pseudarthrosis. The injections never produced any undesirable effects. They are recommended by the author in cases with a delayed union. The serum was obtained by the author from a horse repeatedly immunized with extracts of spleen and bone marrow from a human cadaver. The serum was diluted ten times with physiological saline solution. In some cases injections were repeated once after four days. JOSEPH K. N. AT M.D.

Roth H. Concerning Delayed Sequelae Following Traumatic Luxation of the Hip Joint (Ueber Spätfolgen traumatischer Hüftgelenkluxationen). *Zurich Dissert.* 1940

No uniform opinion exists in the special literature concerning the prognosis of traumatic luxations of the hip joint. This review of the material seen in the Surgical Department of the University Clinic of Zurich from 1919 to 1938 containing 41 cases of traumatic hip dislocations including luxation fractures together with 18 cases of clinical and roentgenological follow-up studies directed against the hitherto too optimistic viewpoint concerning the end results of these injuries.

An absolute rest position is recommended with clinical or roentgenological changes which occur in only

16 per cent of the cases. All of the other cases which were subjected to follow-up study showed changes of all grades, either in the nature of an arthrosis deformans or of an ossifying type (myositis ossificans, para-articular calcifications), or else of a mixed type of both of these forms. Intra-articular associated injuries, especially breaking off of the acetabular margin, were found in 47 per cent of the cases. The prolonged treatment period necessitated by these injuries had a deleterious effect upon the end-result, particularly in the sense of increased deforming joint changes. Difficult or delayed reposition favored the appearance of ossifying processes. This fact indicates that the reposition should be carried out as early as possible and in the most atraumatic manner.

According to the observations made at the Zurich Clinic, the length of the fixation in cases of uncomplicated luxation is of minor importance, intra-articular complicating injuries, on the other hand, demand a sufficiently long period of fixation. In every case, weight-bearing by the injured joint should be withheld as long as possible, i.e., it should not be permitted before two or three weeks in uncomplicated luxations, and at least four weeks in cases associated with intra-articular injuries. This freedom from weight-bearing is best obtained by reposition with an extension dressing. The type of re-treatment appears to be of secondary importance so far as the late results are concerned.

The prognosis in central luxation fractures is to be designated as particularly poor since in the observed cases changes of the deforming type developed in 100 per cent of the patients. As far as the age of the patient is concerned, it was seen that in the group

between forty and seventy years of age as well as those between five and thirty years, there was a tendency toward the deforming type of changes, whereas in the age group between thirty and forty years the changes were more inclined to be of the ossifying type. (SCHENK) HARRY A. SALZMANN, M.D.

Agostinelli, E. Vertical Traction or Traction at the Zenith in Fractures of the Femur in Children (La trazione verticale o allo zenith nelle fratture femorali dei bambini) *Polidam*, Rome, 1941, 48 sez. chir. 45

Children have a tremendous capacity for repair of bone. Nevertheless, this capacity does not suffice to prevent shortening in fracture of the femur if the fracture is not properly treated. The reason for this is that the shortening comes not so much from comminution of the bone as from muscle traction. The author describes and illustrates the methods heretofore in use in treating fracture of the femur in children: (1) fixing the broken limb against the trunk, (2) the use of splints which immobilize the leg, (3) continuous traction, and (4) operation. These methods are criticized and his own method is described and illustrated.

In his method the child lies on his back in bed with the injured leg flexed at a right angle to the body with traction applied to the foot. The child is in such a position that it is easy to keep him clean, and the traction is exercised in such a direction as to bring about the desired effect.

Eight cases treated in this way are described and illustrated by roentgenograms showing the perfect alignment attained.

AUDREY G. MORROW, M.D.

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

- Jorpes E. *Pure Heparin for the Prevention and Treatment of Thrombosis*
 Crafoord C. *Heparin as a Prophylactic Against Postoperative Thrombosis*
 Wetterdal P. *The Use of Heparin as a Prophylactic Against Thrombosis Following Gynecological Operations*
 Leissner H. *The Use of Heparin in Obstetrical Practice as a Means of Preventing Thrombosis*
 Clason S. *Three Cases of Pulmonary Embolism Following Confinement Treated with Heparin*
 Bauer G. *Early Diagnosis of Venous Thrombosis by Means of Venography and Abortive Treatment with Heparin*
 Lindgren S. and Willander O. *The Use of Heparin in Vascular Surgery*
 Rosenquist H. *The Usefulness of Heparin in Combating Arterial Embolism and Thrombotic Complications*
 Lind S. *On the Incidence of Thromboembolism Following Surgical Operations and Its Influence on the Length of the Recumbent Period*
 Hednäs P. *The Use of Heparin in Internal Diseases*
Acta med Scand 194 7 7 73

Though heparin was discovered by Howell and McLean in 1916 its chemistry was cleared up by Jorpes only five years ago and during the last few years the knowledge of its physiology and clinical applications has been greatly increased. It arises from the mast cells of Ehrlich. These cells show a marked predilection for the neighborhood of the finer blood vessels and their function is definitely linked with the vascular system.

Heparin is the body's own anticoagulant which neutralizes thromboplastic substances and assists in keeping the blood fluid. It is prepared from the liver and lungs of cattle. The raw heparin content makes the isolation of it rather difficult. In solution heparin is stable and can be boiled for one hour at 100 C. The potency of the commercial is constant. No secondary reactions result from the use of well purified preparations. The most practical method of its administration is to give four routine daily doses: 50 mgm at 8, 12 and 4 o'clock and 100 mgm at 8 o'clock as a night dose.

Care must be taken that heparin is not given to patients bleeding from gastric ulcers or hemorrhoids and the likelihood of a hemorrhage into the pleural cavity from pulmonary infarcts must always be borne in mind. Menstruation is no contraindication. Any undesirable bleeding may be checked by blood transfusion or in urgent cases by the intravenous injection of protamine sulfate which promptly neutralizes the effect of twice its amount of heparin. Rarely does a serious anaphylactic shock occur on the resumption of treatment that has been temporarily discontinued. This is due to the presence of

small quantities of protein. Heparin itself does not produce sensitization. It is advisable when resuming treatment to begin with desensitizing small doses.

The coagulation mechanism in the body is influenced by operative trauma. Larger quantities of heparin being required to obtain the same prolongation of the coagulation time if it is administered postoperatively than if it is given to the healthy individual preoperatively. This is the best possible evidence of the increased postoperative tendency to coagulation and indicates that the use of heparin is physiologically justified.

Crafoord selected for heparin treatment groups of patients suffering from diseases which have shown a relatively high percentage of thromboembolic complications. Among 325 of these patients a single instance of thromboembolism occurred whereas in the control groups the incidence of postoperative thromboembolism was relatively high. It is evident therefore that heparin is very efficacious as a prophylactic against postoperative thrombosis. As a therapeutic agent however it is too early to reach any definite conclusion as to the value of heparin in already existent thromboembolism.

In gynecological practice thrombosis and embolism are likely to occur particularly after operations for prolapse and tumors of the uterus. One hundred and twenty-seven of such patients were treated with heparin as a prophylactic by Wetterdal and 20 patients with developed thrombosis and embolism were heparinized as a therapeutic measure. Among the former only 1 certain instance of thromboembolism developed and it occurred twenty-two days after the operation and eleven days after the cessation of the heparin treatment while the patient was still in bed. It is advisable therefore that the treatment should not be terminated until the temperature is normal and the patient can leave the bed. Among the 20 patients treated with heparin for already existing thrombosis 6 had pulmonary embolism. All recovered.

In obstetrical practice only 2 of 50 cases which were heparinized developed thrombosis. However Leissner administered the heparin for only forty-eight hours after delivery and the thrombosis appeared much later. In 1 case a serious uterine hemorrhage occurred. To obtain the full prophylactic effect of heparin it appears necessary to administer it for much longer than forty-eight hours.

Clason reports 3 cases of pulmonary embolism treated with heparin all of which were extremely serious and all of which recovered. In peripheral thrombosis a surer and earlier diagnosis can be made by venography than by any other method. With its aid the early manifestation of the disease can be discovered. If at this stage rigorous heparin treatment is begun almost

ideal results can be expected, the whole disease often taking an abortive course. Of 21 such patients treated with heparin all quickly became symptom-free and left bed within a few days. Among 32 patients with similar conditions but not so treated, 2 died, 3 developed pulmonary embolism, and 24 suffered from a spread of the thrombosis to the femoral veins.

The difficulties connected with surgical procedures on blood vessels depend, in the main, on the strong tendency of the blood to form local thrombi at the site of operation and thus obliterate the vessel. Animal experimentation has definitely shown that heparinization prevents this secondary thrombus formation and the vessels remain free. Since heparin prolongs the coagulation time but has no effect on the bleeding time, there is very little danger associated with its use. Bleeding is not increased by heparin. For hemostasis, the vital reaction of the vessel wall, i.e., its capacity to contract, probably plays a far greater role than the process of coagulation. In vascular surgery, heparin should be given as soon as the operation is begun, or, in cases of embolism, as soon as the diagnosis has been established. It should be continued until the patient has left the bed, so that a thrombus need no longer be feared because of the patient's immobile condition. The treatment should not be abruptly discontinued, but the dosage should be gradually decreased. Lindgren and Wilander obtained good results in 10 of 11 cases which they report.

In internal medicine, observations on the value of heparin are too few to justify definite conclusions. In the treatment of thrombosis of the ocular vessels, heparin is very valuable. Favorable effects have been observed in cases of cerebral embolism and thrombosis. Uncomplicated cases of coronary thrombosis are well suited to heparin treatment, but this must be longer and more intense than it usually is.

It is obvious from the reports that heparin is an effective prophylactic anticoagulant, and it is probable that its usefulness in the treatment of thromboembolic disease will greatly increase in the future.

SAMUEL KAHN, M.D.

Zopff, G., and Engelhard, O. The Conditions Favorable for Air Embolism after Opening of the Vena Cava Inferior (Die Bedingungen fuer den Eintritt einer Luftembolie nach Eröffnung der Vena cava inferior). *Zentralbl. f. Chir.*, 1940, p. 2166.

In the entire literature of the last twelve years there is not one report of air embolism of the inferior vena cava. Elberg collected 90 cases of injury to the inferior vena cava from the literature. In the majority of the cases the tear in the vein could be sutured with success (66 were cured and 24 terminated fatally). He emphasizes the danger of hemorrhage and air embolism and in regard to the latter recalls a case of Lindner's. He also recalls the work of Frev in 1920, in which 910 authors are mentioned. Hoffbeinz also cites Lindner's case. In this case

operation was attempted for a tumor of the right kidney—the pedicle and a few centimeters of the vena cava were surrounded by tumor tissue. The distal portion of the vessel had already been clamped, but before the proximal portion could be tied off a murmur set in and within a few moments the patient died of air embolism. This was proved by autopsy examination. The infiltrated carcinoma masses had kept the end of the vessel open and this made a condition favorable for air to enter the circulation.

Borst described a bullet injury of the iliac vein and injury of the small intestine. The gas pressure from the bowel and possibly from air entering at the time of the injury was able to overcome the pressure in the vein and so led to air embolism. At any rate, air or gas will enter the circulation only when the pressure outside of the vessel is greater than that within, or when the pressure in the vessel is lowered by breathing. Long ago Magendie had the right conception that in inspiratory expansion of the chest the blood in the veins is drawn toward the heart. Veins which with inspiration and expiration show a corresponding venous pulse are in danger according to Amusat.

Eppinger's and Hofbauer's experiments and Kuhlenskampf's clinical observations contradict the occurrence of air embolism in leg operations.

The pelvic veins of women deserve special consideration. The examining hand of the doctor introduced into the uterus may increase the pressure already present and so cause air embolism. If the veins are open air is apt to enter and during examination the danger is increased. This knowledge resulted in repudiation of the knee-chest position for obstetrical and gynecological procedures. The extreme Trendelenburg position also favors air embolism, the abdominal content falling against the diaphragm compresses the mesentery and disturbs the peripheral venous flow. A lower than atmospheric pressure is thereby favored. If the levator ani contracts, the arcus tendineus becomes tense and dilates the veins in the urogenital apparatus, and therefore the same dangers are present as in the chest veins.

The "ima-" veins of the thyroid gland are anchored in the mediastinum in such a manner that in injuries they gape readily and allow air to enter, likewise the liver veins with their thin walls, which are so firmly adherent to the liver tissue that they cannot retract in case of rupture. If the blood suddenly sinks in the veins to zero and connection with air exists, hydrostatic laws take effect.

The inferior vena cava possesses a guard against this in that at the moment it enters the chest cavity it receives a considerable influx of blood from the portal circulation. This influx amounts to more than 20 per cent of the entire blood volume. With respiration there is a contraction of the diaphragm and pressure of the liver into the inferior vena cava. Herein lies the protection, even when the peripheral blood supply is deficient. The author proved these points by registering the pressure in the pancreatic

vein on the one side and in the renal vein on the other in dogs (PLENZ) LEO A. JICHKE M.D.

BLOOD TRANSFUSION

Clemens J. The Practice of Blood Transfusion (D. Pra. de Bl. t. b. tragu. g.) D. t. ch. Z. f. h. f. Ch. 1940 54 73

The most noted author in the field of blood transfusion writes from his personal experience in this article. After a general preface on the choice of a donor in which also is mentioned the selection of the donor with specific immune serum, he refers to the importance of the emergency donor organization within the hospital. He believes that the blood should be obtained from the mildly sick in preference to the permanent hospital staff. The universal donors Group O must always be reserved for use in the most urgent cases. The establishment of a central blood conservation laboratory is welcomed in peace and more especially in war. There are, however, many organizational and economic difficulties to be overcome.

The infusion of solutions never takes the place of blood transfusion. Two cases from his experience which confirm this statement are reported. In order to guarantee an accurate blood group determination a double examination is recommended: first with the serum A, B, and O obtained in the hospital from the laboratory, then by the physician himself with the purchased test sera. In urgent cases compatibility may be tested by simply mixing blood from the donor and the recipient or even better by cross matching. The latter should be done in each case in which the same donor is to be used a number of times for the same recipient, for even when the blood groups are alike or Group O blood is used, defense agglutination may occur which later leads to unpleasant transfusion reactions. Two examples are cited. Post-transfusion agglutination is discussed; this manifests itself by microscopic and macroscopic rouleaux formation and finer grainy clumping, but of course occurs only in certain cases. In general it is believed that if one makes use beforehand of the cross agglutination the same donor may be used repeatedly. The author cannot share the doubts of many authors on the use of the O donor on account of the agglutinating capacity of the O serum; he recommends only not to transfer too great quantities of blood in such cases.

The biologic test of Oehlecker with 20 c.c.m. of blood and subsequent observation for one to two minutes has kept its value despite the serologic blood grouping, but the test may fail in the presence of like groups of blood and severe transfusion reactions may then appear. Therefore the larger biologic test with about 150 c.c.m. instead of the smaller one is preferred. This however offers certain technical difficulties in direct transfusion. As the author uses only the indirect transfusion and the form with slow transmisson he can profit by the advantages of the greater test after sufficient ob-

servation of the patient and interrupt every unpleasant reaction immediately at its start. More or slowly transfused blood is more compatible than blood rapidly given. Should a transfusion reaction occur the quantity of blood is subject to precise measurement: 100 c.c.m. is not very serious and from 300 to 400 c.c.m. a favorable result is to be expected. If a serious reaction occurs immediate venesection with infusion of saline solution and new compatible (directly and indirectly examined) blood should be given.

Heart, pericardial lung and kidney disease are best excluded in transfusions. In eclampsia transfusion can be tried after blood letting. Allergic patients are especially to be observed.

In conclusion the author discusses the indirect transfusion on methods with the addition of an anti-coagulant (sodium citrate or heparin).

(MAX BUDDE) THOMAS C. DOUGLASS M.D.

Whitby L. E. H. Vaughan J. and Brown H. Discussion on the Therapeutic Value of Transfusion of Derivatives of Blood. Proc. Roy. Soc. Med. Lond. 94 34 57

Whitby states that transfusions of derivatives of blood may be performed for a large number of reasons which must be clearly defined because almost all of the derivatives lack one or more of the properties of fresh blood and have therefore only a limited therapeutic value. The convenience of blood derivatives should not lead to their improper use. War has led to the development of durable blood derivatives suitable for the restoration of blood volume which is essential for the treatment of secondary shock. Stored blood over a certain age must be included in this category.

Experimental evaluation has placed the order of preference for blood derivative used for restoration of the blood volume as: citrated plasma, serum, hemoglobin, Ringer gum saline solution, red cells, a saline suspension, isotonic saline solution, and glucose. Extensive experience has shown that although citrated plasma is eminently satisfactory it is a disadvantage to use a proportion of blood when the volume to be restored is large.

The authors focus their thought on conditions of secondary shock and severe hemorrhage which are prominent during this time of war. Transfusion is practiced for the following two main reasons: (1) restoration of the oxygen carrying capacity and (2) restoration of the blood volume. Derivatives of the blood are extremely efficient for purposes of blood volume restoration but quite useless for increasing the oxygen carrying capacity, with the exception of stored blood. Whitby notes that carefully taken and refrigerated blood to which glucose has been added does not develop serious fragile properties for at least four weeks.

The corpuscles of young stored blood and of fresh blood are suitable for the preparation of concentrated red-cell suspensions for the treatment of anemia where the object is to provide the maximum

increase in oxygen-carrying power rather than increase the blood volume. This procedure is advantageous for those patients with true aplastic anemia who have to lead a "transfusion life" and in whom it reduces the time taken for a transfusion. Such suspensions have a very poor volume restoring power as judged by experimental results.

The various fluids tried out in resuscitation work are preferred in this order: whole blood, plasma, serum, hemoglobin-Ringer, gum saline solution, isotonic saline solution, and isotonic glucose solution. Citrate plasma, in cases in which the loss to the circulation is due to loss of plasma and so gives rise to hemoconcentration, is recognized as being a more physiological fluid for blood-volume restoration than is blood. For example, in the treatment of 6 cases of burns, citrated plasma has been satisfactory.

In 3 cases of 24 studied, Whitby was impressed by the almost unbelievable amount of blood loss which some patients suffered and still remained alive, the quantitative recovery of the blood pressure as the blood volume was restored, the necessity for the replacement to be not less than 50 per cent of the blood loss, and, for permanent effect, the importance of considering the protein fraction of the transfused fluid. The need of transfusion rarely ended in the resuscitation ward.

Vaughan and Brown analyze the results obtained at the North West London Blood Supply Depot with certain blood derivatives, viz. plasma, serum, and concentrated red cells. The observations are necessarily qualitative rather than quantitative, since air-raid casualties are rarely suitable for accurate controlled studies.

There appeared to be no marked difference in the reaction rates obtained with plasma, normal concentrated serum, and whole blood. Plasma, serum, and blood appeared equally effective in the treatment of patients with shock. Since some degree of anemia has been found in air-raid casualties, best results will be obtained by the administration of both blood and a protein fluid to such patients. In the case of burns, when hemoconcentration occurs, plasma or serum are definitely to be preferred to blood in the first twenty-four hours. Local edema may be reduced by the use of concentrated serum. In the presence of severe sepsis, fresh blood should be given. Concentrated serum has proved disappointing in the treatment of nephrotic edema.

Dried serum has the following additional advantages: (1) it does not clot, (2) it is not readily infected, (3) it is unaffected by temperature, and (4) it has a small bulk. Concentrated red cells have proved valuable in the treatment of conditions in which it is necessary to raise the hemoglobin without greatly increasing the blood volume. No great difference in the dosage of blood, serum, and plasma has been noted.

Plasma may be prepared in three different forms: unfiltered, filtered, and dried. Unfiltered plasma is obtained by syphoning the supernatant fluid off the red cells after sedimentation has occurred, or by

centrifugalization. Filtered plasma is passed through a Seitz filter after separation. Serum is available in three forms: filtered liquid, dry, and as serum citrate prepared from recalcified plasma.

Apart from clinical considerations, serum is certainly an easier fluid to handle in large quantities than plasma, is not readily infected, and does not clot. However, plasma appears an ideal culture medium. If fibrinogen proves to be of any importance in patients with shock, plasma is clearly to be preferred to serum. If high protein content is important, serum is to be preferred.

In conclusion, the three authors state that it is doubtful whether such controlled accurate observations can be made under "blitz" conditions. Possibly severe industrial accidents might provide suitable material for careful investigation.

HERBERT F. THURSTON, M.D.

Hotworth, P., and Skinner, C. Improvement in Blood Transfusion Service. Establishment and Operation of a Blood Transfusion Service. Results of 3,077 Transfusions of Bank Blood, A Statistical Analysis. *Arch. Surg.*, 1941, 42: 480, 493.

The selection and artificial preparation of high-titered test serums, the study of the cause and prevention of hemolytic transfusion reactions, the consideration of the role of subgroups and intragroup agglutinins in transfusion accidents, and the adoption of a simple, accurate technique for the determination of blood grouping and compatibility are described by the authors.

Three ways of obtaining blood are discussed: from the cadaver, the blood bank, and the volunteer donor bureau. Particular emphasis is placed on the blood bank and the method of operation of the one used at the Cincinnati General Hospital. The blood in the bank is maintained constantly at a temperature of from 2 to 4° C. as shown on recording thermometer charts. After the blood is obtained, it is labeled, and on the following morning, it is checked by Kahn, grouping, and matching tests. During one year more than 300 persons having syphilis with no previous knowledge of the disease were found. Separation of the blood of white from that of Negro donors in the bank has been a constant practice for reasons other than scientific ones. As far as is known, no immediate or ultimate effects accompany the transfusion of blood from a person with skin of one color to a person with skin of another.

The adoption of rigid routines in the preparation of solutions and cleansing of glassware and tubing with which the solutions come in contact have reduced the incidence of untoward reactions. Despite careful attention to these factors, the incidence of chills and fever in most reported series of blood transfusions varies from 5 to 20 per cent. In addition to extrinsic factors, it is probably true that the condition of the patient plays a role in these reactions.

Whether the incidence of reaction increases as bank blood ages is another subject of much interest.

At present the figures indicate that the aging of blood does not increase the incidence of reaction. In practical operation the great majority of bank blood units given are under seven days of age.

In conclusion the authors present an analysis of the experience gained and statistics derived from 3,077 transfusions of bank blood at the Cincinnati General Hospital.

1. Blood of the same group as that of the patient is available without delay in 96 per cent of the cases.

2. The incidence of untoward transfusion reactions compares favorably with that in reported series of transfusions of fresh blood.

3. Aging of blood does not increase the incidence of febrile reactions.

4. There is no significant increase in untoward reactions resulting from transfusion of Group A blood as compared with transfusion of blood of the other group.

5. The causes of loss of bank blood are in order: positive reactions for syphilis, expirations of the time limit and clotting. Method for minimizing these losses are suggested.

6. In the 3,077 transfusions of blood given only 1 death occurred which might be attributed to the transfusion.

HERBERT F. THURSTON, M.D.

Jewesbury E. C. O. Reactions after the Transfusion of Stored Blood. *Br. M. J.* 1941; 663.

Transfusions of stored blood are being used freely in England at the present time. The incidence of transfusion reactions from stored blood compares

favorably with that from fresh blood. A modification of Riddell's Classification of the severity of reactions was used to evaluate some 700 transfusions of stored blood. Grade 1 reactions were those in which there was a rise in temperature above 99 degrees following transfusion but in which there was no other sign. Grade 2 reactions were those with temperature plus shivering attacks and mild chills. Grade 3 reactions were obvious rigors. The total incidence of Grades 2 and 3 reactions was 8.5 per cent. Grade 3 reactions occurred in only 4.1 per cent of these cases. This incidence compared favorably with 700 transfusions of fresh blood which had been given in three large London hospitals during the previous year and in which the average incidence was 7.9 per cent.

The author found that reactions were by no means confined to the blood that had been stored the longest, although the incidence of reaction was slightly increased. Fifty-eight transfusions were given with blood that had been stored for more than twenty-one days; the oldest stored blood used was thirty-three days old and produced no reaction.

Hemolysis of stored blood does not increase rapidly until after the twenty-first day after which time jaundice and possibly febrile reaction may occur. Therefore blood stored longer than three weeks should preferably not be used. In vitro hemolysis of stored blood is markedly diminished by the use of glucose as a preservative in which cases the useful life of stored blood may be increased.

HOWARD A. LEITCH, M.D.

SURGICAL TECHNIQUE

WAR SURGERY

Cope, V Z London Under Air Bombardment, Some Medical Aspects *Brit M J*, 1941, 1 523

As a result of the extended aerial bombardment, such factors as disturbance of routine, shortened sleeping time, poor ventilation in some of the shelters, and interference with essential services, especially water supplies due to broken mains, have been involved in affecting communal health. Cope urges greater use of rain water collected in tubs or tanks from roofs against sudden shortage. Transportation has been conspicuously uninterrupted.

A surprising complication of the unforeseen necessity for sleeping accommodations in shelters was thrombosis of the deep leg veins, which resulted from continuous pressure with relaxed muscles against improvised deck chairs, and the concomitant increase in the number of sudden deaths from pulmonary embolism. Lack of toilet facilities in certain shelters, coupled with prolonged stays, accounted for a great increase in urinary retention among old men. Increase in sleeping and toilet facilities has been a successful remedy. To prevent the spread of droplet infection in crowded shelters, the wearing of surgical masks has been introduced. Cope decries the fact that this method of prophylaxis has not been extended on a large scale to industry to help reduce the enormous work time lost annually from colds. The casualty lists, while unpredictably small, are striking for the high proportion (about 40 per cent) of fatal injuries. The explanation of the high fatalities is found in the varying ages and states of health of the victims: the injuring of vital parts by crushing under fallen debris; asphyxia from burial, clouds of dust, or escaping gas; the risk of fatal burning in ensuing fire or steam from open pipes; and the effect of severe shock induced by pressure of heavy structures pinning down the victims.

Injuries from broken glass, while frequent, were serious only if the fragments were numerous enough to cause anemia from extensive bleeding or if they were large and embedded in body cavities. Numerous smaller fragments were left alone usually, their removal being impractical or impossible.

The severest lesions by far were the injuries due to the crushing of bodies or limbs by great masses of debris. Pressure continuing for hours causes an amount of shock so great that the vitality was depressed to the limit of endurance, or beyond it. A new form of intestinal injury, multiple points of gangrene on the coils of the intestinal wall from prolonged pressure, with resultant peritonitis, is described. Also, it has been observed that sudden impact against the abdomen in blasting may cause serious intestinal injuries.

Blood pressure and pulse pressure have been found to be the most reliable measurable factors in the

recognition of shock, though specific gravity of the peripheral blood and measurement of the blood volume are accurate if available. Rest, warmth, morphia, and blood and plasma transfusions were effective in counteracting shock.

The immediate medical treatment of casualties fell into the lot of mobile units, dispatched to the scene of incidents, and the first aid posts. The more serious cases were sent on by these to the nearest hospital. The London experience supports Trueta's view that first-aid posts should be held in or attached to an adequately equipped hospital. Bombing has disrupted general medical practice, diminished the number of available beds in central hospitals, and interfered with the regular clinical teaching of medical students in hospitals. EDWIN J PULASKI, M D

McKissock, W, and Brownscombe, B Apparently Trivial Head Injuries, Preliminary Treatment and Examination, Results and Pathology, Practical Points in Treatment *Lancet*, 1941, 240 593

A group of 53 patients, all of whom had received apparently trivial head injuries, were statistically analyzed by the authors. Many of these patients had scalp wounds, and there was a history of unconsciousness produced by trauma in all of them. In none of them, however, was there roentgenographic evidence of skull injury.

Operation (apparently scalp suturing) had been performed in 27 of the patients before the authors saw them, but healing had occurred in only 2, and many of the wounds were suppurating. The authors attribute these poor results to retained foreign bodies, lack of extensive scalp shaving, and closure of the wounds with through-and-through gut sutures.

Abnormally raised or lowered intracranial pressure (as measured by lumbar puncture) was found in 19 cases, blood was present in the C S F in 16 and 41 individuals showed abnormal signs referable to the central nervous system, such as pupillary, motor, reflex, or mental changes.

The authors did not hesitate to perform lumbar puncture as they are of the opinion that this does not result in increased intracranial bleeding; in fact, lowering the pressure may reduce the venous pressure and thereby reduce bleeding.

The patient with these head injuries should be made comfortable and treated for shock for the first twenty-four hours after injury. Intracranial pressure should be maintained at a normal level by regulation of the fluid intake through elimination of fluid by way of the bowel with magnesium sulfate enemas, and the judicious use of lumbar puncture.

The authors believe that a first-aid dressing only should be applied at the time of injury and subsequent care should be given when adequate facilities exist. The scalp wound should be widely shaved and

cleaned and the damaged tissues and foreign bodies excised. The galea and skin should be sutured in two layers with silk sutures.

Of the 53 cases analyzed all showed complete recovery as far as neurological findings were concerned.

LUTHER H. WOLFF, M.D.

McIndoe, A. H. *Surgical and Dental Treatment of Fractures of the Upper and Lower Jaws in War Time. A Review of 119 Cases.* *Proc. Roy. Soc. Med. Lond.* 1941 34: 267.

The author points out that the causes, distribution and varieties of fractures of the jaws and their associated complications in war time differ greatly from those seen in civilian practice and that these fractures have presented many new problems. The communication deals with the surgical and dental management of 119 cases of fractures of the upper and lower jaws which have been treated in an E.M.S. maxillofacial unit. As might be expected a considerable portion of the patients had associated injuries such as tissue lacerations and fractures of other bones. The following table gives the classification of the material.

Total number of patients with fractures of jaws	119
Total number of patients with fractured jaws treated with the injuries	68
Total number of patients with fractures of jaws with other injuries	5
Fracture of the mandible	8
Fracture of the maxilla	37
Fractures of the mandible and maxilla	7

A large percentage of the patients were fit young men on active service between eighteen and thirty-five years of age but on account of the bombing of the civilian population females (18 per cent) and older people varying in age from six to seventy-two years were among those injured. Many of the accidents occurred in patients sitting quietly at home. The cause of the injuries as can be expected was extreme violence. Only 18 were from blows, kicks and falls. Bomb and mine explosions and penetrating missiles accounted for 45 per cent. In many cases there was severe facial injury with localized but great bony damage. The collapse of buildings which caused the patient to be struck by a mass of masonry or hurled head first onto it produced 13 per cent. Head-on crashes in airplanes, automobiles and motorcycles were only second to the effect of high

explosives, namely 36 per cent. In this group there was a maximum of bone damage and displacement with a minimum of soft tissue injury. The second table is a classification of the causes of the 119 injuries.

In general it may be said that the excessive violence of most of the trauma tended to produce a much more severe bony injury than that encountered in civil life. Seventy per cent of the mandibular fractures were double, multiple or comminuted. In 12 per cent bone grafts were or will be necessary. The incidence of unilateral and bilateral condylar fractures is significant. The maxillary fractures were mostly due to head-on crashes and other forms of extreme violence. The number of middle third facial crush fractures was comparatively small (5) that is fractures in which the entire nasal maxillary compound was thrust bodily backward into the face.

The writer points out that a careful clinical examination is of importance and that x-rays should be taken from various points of view including a view of the whole head and rotating views of the lower jaw to include the temporomandibular joints.

The treatment of these injuries differs considerably from that adopted in similar injuries in other parts of the body. Because of the good blood supply and the well known resistance to infection on radical excision of the damaged tissues and removal of foreign bodies need not be performed at the earliest moment to avoid sepsis and gas gangrene.

Co-operation and teamwork in dealing with facial injuries and the construction of splints for the reduction of fractures is stressed. The soft tissue injuries are treated in two different ways in which the time factor plays a role in relation to possible infection. Facial injuries seen within the first twelve hours may be sutured with impunity, providing great care is taken to cleanse the wounds thoroughly with soap and water and saline solution and to remove thoroughly all foreign bodies and dirt. After twenty-four hours suturing is not advisable for the risks of sepsis rise steeply. After this time the wounds should be packed open with saline gauze which is changed frequently. The author states that it is remarkable how well a facial wound packed widely open with saline gauze will heal in the absence of all tension and how rapidly a breakdown will occur under the reverse conditions. Comparatively little scar results from this procedure but the subsequent removal of the marks of badly placed sutures which have cut in is far from easy.

Drainage of all compound injuries of the jaws associated with external wounds is important at whatever time they are seen. Rubber tubes of sufficient width bore are recommended. Shepherd has devised an effective method of saline drip irrigation through a catheter to be used in wounds with small points of entry and exit but with severe damage within the mouth. The saline solution is run in from time to time from a flask type of irrigator controlled by the patient himself.

Bomb and shell fragments in	45
Gunshot wounds	9
(Mostly penetrating perforating wound)	
Crush fractures	6
Motor car and motorcycle accidents	23
Plane crashes	8
(Mostly severe comminuted fracture with gross displacement)	
Blows and kicks	9
Falls	9
(Mostly localized fracture without comminution)	

The fractures of the mandible are treated with permanent immobilization of the fragments, the clearing up of sepsis in the fracture lines being the ideal to be aimed at. The methods of immobilization are by means of (1) interdental ewelet wiring (2) intermaxillary arch wiring and (3) cast-metal cap splints. The reasons that the author believes that the latter are best suited are (a) they give positive fixation and stable immobilization (b) they can be modified in many ways to make them useful for all edentulous cases (c) there are no wires to break or readjust (d) in certain fractures of the lower or upper jaws a single rigid splint is sufficient and mastication is not interfered with (e) with the use of locking devices and hooks, many problems difficult of solution with wiring methods can be overcome and (f) cap splints do not harm the gums.

To control sepsis, teeth in the fracture lines are removed except when a single tooth remains on a fragment. It is then retained as long as it is of value for immobilization. Pieces of bone are retained if they have a chance of survival, except in cases with extensive loss of bone, in which bone grafting is inevitable. Unerupted third molars lying in fracture lines are retained until sufficient consolidation has occurred to make removal safe. The splints are so constructed that questionable teeth can be removed later without disturbance. This conservative treatment of bone fragments leads to the extrusion of sequestra, and, if purulent discharge persists, the fracture cavity is curetted and dead fragments of bone are removed. The following figures are instructive as to the presence of sepsis:

Mandibular fractures with perforating wounds— all drained	34
Mandibular fractures without perforating wounds —no abscess, no drainage	42
Mandibular fractures without perforating wound —abscess requiring drainage	6

In simple fractures the splints are removed after from four to six weeks and the mandible is tested for union. If union has failed to take place, the splints are re-applied for a further four weeks. Consolidation may take a considerable amount of time, sometimes three or four months in the case of perforating wounds with extensive comminution.

Fractures of the maxilla require early disimpaction and immobilization. Unilateral maxillary fractures are disimpacted with the fingers and immobilized by means of a complete cap splint. Bilateral maxillary fractures constitute a much more serious problem. Both horizontal fractures, those including only the alveolar part with the palate, and those in which the entire third of the face is thrust bodily back and between the malar bones into the ethmoid region, should be disimpacted at once. This is of great importance because reduction or becomes extremely difficult as consolidation occurs.

Immobilization depends on the finding of a point of resistance by splinting the lower teeth with full upper and lower cap splint and by a prying traction

with a Kingsley type of splint and plaster head cap. If the antra are also crushed a rigid type of external fixation in head gear is essential. Still more difficulties are encountered when the nasal and malar bones are involved. In these cases constant external traction by means of wires or elastic bands attached to bars projecting from a head cap have been found to give good results.

The author also gives some space to surgical complications and sequelae of fractured jaws. Non-union entails a search for such factors as sepsis, sequestra, teeth in the fracture line and inadequate immobilization. Malunion may mean surgical division of the fracture and resplinting in correct position. To do this in the lower jaw, a Gigli saw passed around the site of the fracture, dividing the jaw transversely, is recommended. In the maxilla, the approach to the fracture lines is made through the upper buccal sulcus. After division with chisel and hammer, and cutting through the fibrous adhesions, it is possible to bring the displaced part into normal position, and, by means of external elastic traction or weight and pulley, the jaw is held in position.

Soft-tissue deformities entail the removal of scars or the repair of extensive tissue losses. These operations are undertaken only after the fracture has healed soundly. Microstoma, which results from associated burns, sometimes makes an early operation necessary in order to perform the initial oral work. Repair of the buccal sulcus is often needed so that well fitting dentures can be applied. Ridge extension or skin grafting has been found helpful in such cases.

Ankylosis of the joints, particularly in cases of condylar lesions, involves one or both temporomandibular joints. In some cases it becomes necessary to resect one or both condyles, including half an inch of the mandibular neck, to form a false joint. The condylectomy is followed by fixation of the jaws for one week, after which the exerciser is used to regain movement.

Bone grafting which is necessary in 12 per cent of the cases, is not undertaken until from four to six months have elapsed from the last signs of sepsis. The use of iliac crest bone grafts was found to be eminently satisfactory and has entirely supplanted other methods. Bone from this source is tough and can be bent and shaped. It is highly osteogenic and is easily obtained in amounts sufficient for the smallest or the largest bone graft without difficulty to the patient. The grafts, after shaping are wired accurately between the exposed fragments with stainless steel ligatures. Union should be firm in four weeks and movement can then be allowed.

KERR H. THOMAS, D.M.D.

Coleman, C. G. War Wounds of the Nervous System. *Ann. Surg.* 1921, 73: 732.

The purpose of this communication is to recall briefly the principles of treatment found to be effective in the management of wounds of the nervous system in the First World War. It is a summary of the

of the advances made through the application of these principles to similar injuries in civil life.

Among the 174,296 battle injuries in the American Expeditionary Forces reaching hospitals, the head alone was involved in about 6 per cent and of these about 15 per cent resulted fatally. The delay in surgical treatment of penetrating wounds of the head and lack of unanimity of opinion as to the best method of treatment were important factors in the mortality of casualties involving the head alone in the early period of the war. Another important factor was the frequent association of severe injuries in other parts of the body. In the early part of the First World War the operative mortality of gunshot wound of the brain was about 60 per cent. This was reduced to about 28 per cent by the operative method advocated by Cushing. There have been no important modifications of his technique of operation for gunshot wounds of the brain in warfare or in civil life since it was first proposed.

From transportation by airplane of soldiers with gunshot wounds of the head in field operations has been successfully used in some of the countries now engaged in war but open wounds of the brain do not well tolerate elevation of more than 5,000 feet. Experience has shown that patients with head injuries when not in shock stand ordinary transportation very well. This also applies to patients in good postoperative condition. While every effort should be made to provide early operation for penetrating wound of the brain, a delayed operation at a station or hospital where complete surgical treatment can be provided is much better than an early inadequate operation.

It is highly desirable that open wound of the brain should be operated upon within a few hours if possible. However many cases may be operated upon to advantage as late as forty-eight hours or more if obvious infection is not present. It is reasonable to expect that chemotherapy promptly instituted in penetrating wound of the brain will increase the number of cases that may be benefited by later operation and that the incidence of severe intracranial infection will be reduced by chemotherapy in all cases.

The treatment of head wounds at First Aid Posts should be limited to the control of external hemorrhage, treatment of shock, lavage of the scalp and irrigation of the wound with saline or Ringer's solution followed by the application of a sterile dressing and the administration of prophylactic tetanus antitoxin and some of the sulfonamide compounds. No effort should be made to remove bone fragments or other debris unless they are loosely in the wound.

When the patient with a penetrating wound of the head has been placed under conditions suitable for complete investigation, careful neurologic examination should be made and the entire head examined. Patients may be given morphine preliminary to the use of local anesthesia by novocaine injection of the scalp. Local anesthesia should be employed in every case if practicable. Sometimes

the treatment of shock and the intracranial operation may be carried out simultaneously.

The fundamental objective in the treatment of penetrating wounds of the brain is the prevention of infection. Disinfection of a penetrating wound is accomplished by copious irrigation of the wound with saline or Ringer's solution excising the edges of the scalp wound and careful removal of bone fragments, macerated brain tissue, blood clot and foreign bodies when ever practicable. Chemical disinfection of fresh wound should be discontinued in view of the superior results from mechanical disinfection with large quantities of saline solution. Macerated brain tissue is removed by irrigation through a catheter attached to a bulb syringe supplemented by gentle suction through a bent glass tube attached to the suction tip. By the use of irrigation and suction alternately the macerated brain tissue, blood clot and foreign bodies may be removed. Great care must be exercised in following the track of the bullet in order to prevent further injury to brain tissue and in many cases to avoid penetration of the ventricles. All foreign bodies should be removed when accessible. Provided this is compatible with the protection of important functional areas, bleeding vessels may be drawn up into the suction tip and coagulated with the electro-surgical unit under direct inspection made possible by the use of the lighted spatula. After thorough cleansing and complete hemostasis the brain defect is filled with Ringer's solution. The dura should be closed securely without drainage unless there is some doubt as to the completeness of disinfection. The scalp is closed in layers with interrupted fine silk sutures. Drainage of the scalp wound is unnecessary.

When there is evidence of infection on the operation, multiple incisions be a limited one. If an accessible bone fragment may be removed the opening in the dura enlarged and drainage provided. The scalp wound should be packed with vaseline gauze and not sutured. The resulting brain fungus should be protected by a rubber dam over which is placed a doughnut ring of gauze.

The prevention of infection by thorough removal of dead brain tissue, blood clot and foreign bodies will minimize the subsequent causation of infection and thus decrease the chances of epilepsy.

The surgical management of compound fractures of the skull with dural laceration is similar in principle to that of penetrating gunshot wounds of the brain.

In all types of spinal injuries proper handling of the patient is of greatest importance in order to avoid damage of the cord. Increase of the damage of an existing cord injury. Penetrating wounds of the spine may require operation for the purpose of disinfection for the removal of the penetrating agent in part or removal of the cord. The cord lesion may be physically completely removed from the conus medullaris if the penetrating missile even though the cord itself has not been hit. In many of such cases function

tion is recovered in a short time with little residual impairment, while in others the cord may be completely disintegrated by the concussion. Practically all that can be accomplished by operation in gunshot wounds of the spinal cord is the disinfection of the wound and removal of fragments of bone and foreign bodies which rarely cause compression.

Before the primary operation for repair of deep wounds of the extremities, a neurological examination should be made, in order to determine whether there is involvement of important nerves. The disinfection and debridement of such wounds, when nerve impairment is probable or evident, should be undertaken by those competent to expose, identify, and suture a divided nerve at the time of the primary treatment of the wound. Early suture of a divided peripheral nerve is desirable. Chemotherapy may be utilized to prevent or retard infection.

In patients with paralysis of a peripheral nerve, in whom the condition of the nerve was not ascertained at the time of the repair of the wound of the extremity, the type of nerve lesion should be investigated at open operation as soon as the local condition of the wound will permit. It is advisable to wait three months after healing of an infected wound before exploration and suture of the nerve are done, but it is important that infection be eradicated as early as possible so that later suture may not be delayed longer than absolutely necessary. If infection develops after primary suture of a nerve, it is often advisable to excise the suture line and resuture the nerve after the infection has been eradicated. Peripheral nerve lesions are often associated with injury to important blood vessels of the extremities, and this, undoubtedly, contributes to unsatisfactory end results.

Physiotherapy and proper splinting are essential adjuncts to the successful treatment of peripheral nerve injuries. To obtain the best results, both should be started early and continued through the period of paralysis.

The use of autogenous transplants to bridge wide defects in peripheral nerves, has been, so far as the author knows, unsuccessful in every case.

The facial nerve is sometimes paralyzed by gunshot wounds of the mastoid region. Facial paralysis resulting from such wounds usually requires anastomosis with another motor cranial nerve. The hypoglossal is preferred for this anastomosis. Traumatic lesions of other cranial nerves do not require surgical treatment.

Further research is needed on nerve transplantation, particularly in view of its almost universal failure in peripheral nerves and the good results claimed for transplantation in facial nerve defects. It is also important to have further information on the relative effects of early and delayed suture in the final recovery of function, and on the length of time after which no further benefit can be expected from surgical treatment of divided nerves. The technique of nerve repair, the treatment of neuroma in continuity, the effects of neurolysis—all present problems which

are by no means settled and are worthy of further study.

SAMUEL H. KLEIN, M.D.

Osborn, G. R. Pulmonary Concussion ("Blast") *Brit. M. J.*, 1941, 1, 506

Pulmonary concussion is defined as a hemorrhagic lesion of the lungs caused by the blast of a high explosive in a confined space such as a house or shelter. The increase in positive pressure by the detonation compresses the chest and abdominal walls and results in rupture of the pulmonary alveolar capillaries. In addition, there may be rupture of the goblet cells in the bronchi and bronchioles which yields a bloody mucoid expectoration. Pleural involvement or rib pathology need not occur. In some cases, the abdominal component of this explosive force produces a characteristic basal injury to the lung described as a phrenicocostal sinus pneumonia. Associated with the latter, there is always a tear in the liver or spleen. The severity of the lesion depends on the age of the patient, the rigidity or flexibility of the chest wall, the respiratory position of the lungs, and the amount of protective clothing worn. The younger the patient the more easily compressible the thorax, hence the greater the degree of pulmonary concussion. External evidences of trauma are usually not visible on either the chest or abdominal wall. Pulmonary hemorrhage is not progressive but shock is rapid in appearance. Pulmonary concussion with its other manifestations should be suspected in all patients suffering from the effects of a high pressure blast.

BENJAMIN G. P. SHAFIROFF, M.D.

Ogilvie, W. H. Wounds of the Knee Joint, Wounds Seen Within Six Hours, Wounds Seen Later, Sepsis, Closed Plaster. *Lancet*, 1941, 240, 471

Synovial folds of the knee joint can limit the spread of infection unless broken down by movement or tension. Any form of immobilization of an injured knee from the earliest moment is the prime factor of success unless infection has been prevented or defeated. The only material which gives 100 per cent immobilization of the knee is the plaster spica. The plaster cast must immobilize well enough, far enough, and long enough. It can immobilize well only if it is skin tight over the greater part with no more padding than a little thin felt over the vulnerable bony points.

Before operation every case should be x-rayed to locate any foreign bodies.

The majority of the penetrating wounds of the knee joint are without bone injury. For wounds seen within six hours, operation is carried out while using a tourniquet proximal to the wound and the strictest aseptic precautions. The wound track is excised in one piece. The knee cavity is irrigated thoroughly. Primary suturing has been found to be more disastrous than successful, yet primary suturing should be carried out when possible because a drained knee nearly always means limited movement.

Cases with injury to the patella or partial injury to other bones should be operated upon immedi-

ately Splintered patellas are usually removed completely

Complete fractures of the tibia or femur complicated by injuries to vessels or nerves ordinarily demand primary amputation. An injury to the head of the tibia is usually more serious than one of the femoral condyles

Wounds of the knee joint which are received between six and twenty four hours after their primary injury can be debrided. Others are frankly infected. The joint is washed out with a weak antiseptic solution afterward the whole cavity is packed with vaseline gauze and the limb immobilized in a plaster cast and the patient is put on a course of sulfanilamide. After twenty four hours the time for debridement has passed. A man who is doing well looks well and feels well. Pain is the most important single symptom. Aspiration in many instances will make the diagnosis clear. This depends upon whether the fluid is clear or opalescent. Some blood; to be expected although hemolyzed blood is of grave importance and suggests a streptococcal infection.

The use of extension on the knee by means of weight removes the pressure from the cartilages but in doing so tends to open the joint which prevents localization of the infection and encourages the spread to the condylar pouches.

In actual practice the dressing of large sensitive surfaces proved very exhausting to the patient. Irrigation by means of Carrel tubes did not give the satisfactory results which were obtained by packing the cavities with vaseline gauze and immobilizing the limb with plaster. The Carrel method is too elaborate for use in military surgery under the conditions prevailing at present.

RICHARD J. BEVETT, JR., M.D.

Bigger, I. A. Peripheral Vascular Injuries. 1 S. 5, 941, 3, 677

Peripheral vascular injuries involve both the arteries and veins but the arterial injury is more important for because of the high arterial pressure hemorrhage is more profuse and more difficult to control. Also obstruction to the flow of blood through a main artery is more apt to produce serious damage to the tissues than is obstruction of the return flow in the concomitant vein.

When a large vessel of the trunk, either artery or vein, is injured, fatal hemorrhage frequently occurs because the vascular wound usually communicates directly with one of the body cavities. Perforation of a large peripheral vein usually communicates with the surface by a narrow channel and therefore results in only moderate blood loss for shifting of the muscle planes obliterates this channel and traps the blood in the tissues which produces a rapid rise in the extravascular pressure and prevents further bleeding. Bleeding from a peripheral artery may be controlled in the same way but a high extravascular pressure is necessary to control the arterial bleeding and this may produce serious obstruction to the blood flow distal to the injury.

The treatment of vascular injuries depends upon many factors such as the vessel injured, the presence of persistent or recurrent hemorrhage, the condition of the distal circulation, the general condition of the patient and the available facilities. Bleeding from large vessels may be controlled by the application of ligatures by digital pressure or by a tourniquet.

Early operation is indicated if there is continued or recurrent bleeding, inadequate distal circulation to the wound or a large amount of devitalized tissue. Superficial infection is an indication for delay because the entire operative field is apt to become infected if operation is performed under such circumstances.

Vascular suture with maintenance of the lumen of the main artery is the ideal procedure. The following objections have been advanced: (1) it is more time consuming and because of the necessity for prolonged anesthesia is probably more shocking than ligation; (2) it requires more refined instruments and suture material which are not always available; (3) if gross infection occurs the danger of secondary hemorrhage is increased; and (4) the vascular damage is often so extensive that direct suture is not practical.

The danger of severe infection and secondary hemorrhage is reduced by the systematic and local use of the sulfonamide derivatives. The only objection to the local use of sulfanilamide powder is that it increases bleeding.

When suture of an artery is not feasible, ligatures must be applied and the vessel divided between them. Silk is especially indicated under such circumstances and large ligatures should be used for large arteries as the larger ligatures are less likely to cut through.

Ischemic gangrene is apt to follow sudden obstruction of the popliteal, common femoral, carotid and axillary arteries. When one of these arteries is obstructed, every precaution should be taken to prevent circulatory insufficiency. Measures to be considered in this connection are listed below in the order of their importance: (1) sympathetic nerve block; (2) prevention and control of infection; (3) occlusion of the concomitant vein; (4) position of the involved extremity; (5) avoidance of undue pressure; (6) local temperature control; (7) the Pavlov machine; and (8) other measures such as restoration of the blood volume and cell content, nicotinic acid and papaverin.

In concluding the author states that when important arteries are occluded, certain measures should be employed to combat ischemia among them: ligation of the concomitant vein or veins and sympathetic nerve block. The latter is especially valuable and should be undertaken immediately if there is any evidence of insufficient collateral circulation. In addition to these local measures, certain general measures must also be given consideration. The most important of these is blood replacement.

H. B. T. F. THURSTON, M.D.

Blalock, A., and Mason, M. F. *Blood and Blood Substitutes in the Treatment and Prevention of Shock, With Particular Reference to Their Uses in Warfare* *Ann Surg*, 1941, 113 657

The authors discuss the use of blood and blood substitutes in the treatment and prevention of shock. It is generally agreed that the single most effective method for combating shock lies in supplementing the reduced blood volume by the intravenous introduction of fluids. This article deals mainly with wound shock in which there is a decrease in the blood volume due to the loss of whole blood or plasma or both. The consequences of this reduction of blood volume are an inadequate venous return to the right side of the heart, a decline in the cardiac output, a fall in the blood pressure, and stagnant anoxia.

The fluid loss in the early stages of peripheral circulatory failure is mainly local, at and near the site of injury. The general loss of plasma usually does not occur until after the reduced blood volume and pressure and the associated anoxia have resulted in a general increase in capillary permeability. The best means devised for preventing or combating this general increase in capillary permeability in secondary shock consists of the introduction of adequate quantities of whole blood or plasma.

The ideal treatment of shock consists of replacing fluid at the earliest possible moment in the form in which it has been lost. This ideal is not always obtainable and less effective means of therapy may be necessary. Replacement of lost fluids may be accomplished by giving isotonic solutions of salt or glucose, hypertonic solutions of crystalloids, gum acacia, gelatin-saline, hemoglobin-Ringer, whole blood (fresh or preserved), liquid blood plasma or serum, or dried plasma or serum.

Isotonic solutions of salt or glucose are of much greater value in the prevention of, than in the treatment of shock. Solutions of crystalloids are not satisfactory and acceptable blood substitutes in the treatment of shock. Gum acacia ranks next to blood plasma or serum, however, it is less effective and more dangerous than either plasma or serum. There are many objections to the use of gelatin-saline and hemoglobin-Ringer solutions. Administration of large amounts of whole blood in the treatment of shock even when accompanied by hemoconcentration is not contraindicated.

Liquid blood plasma and serum are the most useful of all fluids in shock therapy. They are distinctly valuable from the point of view of nutrition, the protein of these fluids being readily available for catabolism as a source of energy. Nitrogen balance may be maintained even in a starving animal by transfusion of adequate amounts of these fluids, and these fluids are more effective than whole blood in this respect.

The choice of whether plasma and serum should be used in the concentrated or unconcentrated form should depend on the nature of the injury. If the plasma volume is markedly diminished and the tis-

ues are dehydrated, the use of the unconcentrated form appears to be indicated. Plasma and serum are free from reaction-producing substances, are physiologically and therapeutically identical, and may be used interchangeably.

The problems related to the collection, preservation, transport, and dispensation of whole blood and plasma have been discussed with special consideration to military operations. The limitations of whole blood are accentuated under conditions of warfare, and the more readily preservable plasma is better adapted to cope with these complications. This is true particularly of dried plasma which may be preserved indefinitely at uncontrolled temperatures. The length of time that sterile liquid plasma may safely be kept unrefrigerated is not yet satisfactorily established, and may be limited. In civil life, dried plasma can be made available in communities remote from blood banks, or where direct whole-blood transfusion is inconvenient or impractical. Dried plasma is expensive. Sterile distilled water must be available where it is used. Some time is required for it to go into solution. However, the dried form will remain superior to liquid plasma until the problem of permanent preservation of liquid plasma is solved.

In the treatment of traumatic shock the primary objective is the restoration of the blood volume which has been reduced in consequence of hemorrhage, or loss of plasma locally at the site of injury or generally as a result of increased capillary permeability. Only whole blood or plasma may safely, effectively, and permanently restore the volume of the circulation, and of these plasma is preferable because a unit volume supplies more osmotically active protein than does whole blood. The whole blood is essential only in the presence of profound anemia.

Investigations on the intravenous injection of animal plasma are encouraging but have not yet progressed beyond an experimental stage.

In concluding, the authors state that the program of medical preparedness should include the organization of a number of well-equipped units in various cities throughout the country for the collection and preservation of whole blood and plasma. Emphasis should be placed upon the development of more efficient and less expensive means of preparing dried plasma, upon improving the preservation of liquid plasma and, possibly, whole blood, and upon the development of animal plasma, or other protein substitutes for these. HERBERT F. THURSTON, M.D.

Ross, J. A., and Hulbert, K. F. *Treatment of 100 War Wounds and Burns* *Brit. M. J.*, 1941, 1 618

An analysis of the treatment of 100 war wounds, the majority admitted within six hours of injury, is presented. Many of the injured were airmen and nearly all required anti-shock measures on arrival. In addition to the usual treatment, blood or plasma was given in certain cases. When salines were indicated, the intramuscular route for injection was pre-

ferred to eliminate the risk of pulmonary edema. Wounds of the limbs constituted the greatest number of cases the majority being compound fractures. Excision in early cases and débridement in late cases followed by resection under fluoroscopy, packing of the wound lightly with acriflavine paraffin gauze and immobilization in plaster of Paris for about two weeks lessened the incidence of infection in wound, and aided in the resolution of infection if it had set in. Multiple minute puncture wounds were simply painted with Tril or gentian violet and let alone without dressings. Through and through bullet tracks were let alone unless bone or large vessels were involved.

Thorough preliminary cleansing of burns under anaesthesia followed by the silver nitrate tannic acid gentian violet treatment again proved successful.

Chemotherapy is not considered necessary as a routine measure in the treatment of early wounds occurring in areas where the soil is not heavily contaminated with anaerobic organisms. Its best use is as a prophylactic agent in large wounds which it has not been possible to clean completely. The local application of sulfonamides was not tried. Chemotherapy in one case of anaerobic infection was of no benefit and amputation of the involved limb was eventually necessary. All cases had antitetanic serum and no case of tetanus was seen.

Pentothal sodium administered intravenously has proved a safe and satisfactory agent for routine use in war surgery and especially with gas oxygen as a supplement. All patients were given morphine prior to anaesthesia if possible and 1 gr of phenobarbital b.i.d. for several days afterward with excellent results. The use of local anaesthesia in the treatment of war wounds is strongly deprecated.

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Colebrook L. Lewis E. E. Mowlem R. Flinn G. A. and Others. Discussion on Chemotherapy and Wound Infection. *Proc R. Soc. Med.* Lond 1941 34 337

This article consists of a series of abstracts from a symposium on chemotherapy of wound infection presented by the Royal Society of Medicine. All participants are at the present time actively engaged in the treatment of war injuries. Colebrook in opening this discussion stresses the fact that the sulfonamides are extremely diffusible throughout the body tissue and are the only known group of antiseptics which not only have a direct effect on most of the bacterial contaminant of wounds but which also maintain their bacteriostatic effect for many hours when placed directly into the wound. All other antiseptics rapidly lose their bacteriostatic properties when placed in contact with blood or tissue fluid. Experimental evidence seems to have verified this statement. Wounds were made in guinea pigs and then infected with 10,000,000,000 of clostridium welchii and clostridium putrefaciens. Sulfathiazole injected at the same time as the bacteria saved 75 per cent of these animals.

Clinically it is hoped that gas gangrene infections may be prevented in war wounds by the early direct application of the sulfonamides. If these drugs do have this bacteriostatic effect the safe period for surgical exploration and primary suture may be markedly prolonged. Already there is clinical evidence to show that compound fractures may be safely placed in closed plaster casts after a thorough application of sulfanilamide to the wound.

It was generally agreed that the sulfonamides should be applied directly onto the wound and worked in with the finger or a spatula until a thick uniform layer is obtained. After the first application of sulfanilamide the wounds are not inspected until after the fifth day at which time the majority are of healthy appearance and there is a surprising absence of infection. Burns are treated by the same technique. In all cases of wounds or burns soap and water cleansing is first used and primary débridement is carried out before the dressing is applied.

The use of the sulfonamides in skin grafting was also stressed. It was pointed out that before the new technique was used the percentage of failures of take in large skin grafts was extremely high. Five English surgeons using the same technique for the preparation of wound with adequate cleansing and pressure dressings for many days and weeks grafted 300 cases. Only 16 per cent of these cases gave a 100 per cent take, an additional 27 per cent showed a 75 to 100 per cent take and the percentage of total failures was high. At the present time the technique is to keep the wounds clean for the first three days after which a thick layer of sulfanilamide and a pressure dressing is applied. (The authors believe that sulfanilamide applied too early may slow the separation of sloughs.) After three days of the sulfanilamide dressing the wound is usually ready for grafting. Before the graft is applied the granulations are excised and another layer of sulfanilamide is applied. The graft is then placed directly over this layer and a pressure dressing is used. Sulfanilamide is given by mouth for thirty-six hours postoperatively. More than 40 cases have now been treated and there has been only 1 failure. All the rest have shown from 75 to 100 per cent take. In view of the experience with other methods these results were believed to be extremely gratifying.

The relative bacteriostatic effects of sulfanilamide, sulfapyridine and sulfathiazole were demonstrated by *in vitro* experiments. Sulfathiazole was shown to be the most potent bacteriostatic agent on *Streptococcus pneumoniae* and *Staphylococcus aureus*. It is 25 times as bacteriostatic as sulfanilamide. Pus fluid inhibits the bacteriostatic effect of all of these drugs.

There is a possibility that a new compound produced by a particular mold penicillium and known as penicillin may have distinct future possibilities as a bacteriostatic agent. In its crude form which contains only 30 per cent of the active principle it is 4 times as bacteriostatic as sulfathiazole in the test tube and it is not inhibited by large numbers of bacteria as pus fluid.

SURGICAL TECHNIQUE

Finally, some experimental results on wound healing were presented. Antiseptics containing zinc or inorganic halogens generally killed off the fibroblasts more rapidly than they killed the infecting organisms. Sulfanyl flavine and protosil showed a low toxicity toward fibroblasts and epithelium and increased the rate of granulation and fibrosis.

HOWARD A. LINDBERG, M.D.

Chemotherapy for Infectious Diseases and Other Infections, Circular Letter No. 81 War Medicine, 1941, 1: 55

The data on which this circular letter is based have been prepared by the Committee on Chemotherapy and Other Agents and the Subcommittee on Infectious Diseases, of the Division of Medical Sciences, National Research Council. This outline is published as a general guide for medical officers and is to be used with due consideration of all other factors which may be presented by each individual case. It is not intended that it be used to the exclusion or neglect of other indicated therapeutic or nursing procedures. The following conditions are discussed:

1. Hemolytic streptococcal infections

1. Mild or moderately severe hemolytic streptococcal infections, such as erysipelas, mild cellulitis, and tonsillitis. Sulfanilamide is recommended as the drug of choice.

2. Otitis media. If the offending organism is the hemolytic streptococcus, sulfanilamide is recommended. If the infecting organism is a pneumococcus or staphylococcus, sulfathiazole is recommended.

3. Severe hemolytic streptococcal infections, such as meningitis, septicemia, severe cellulitis, acute osteomyelitis, and acute mastoiditis. Sulfanilamide is recommended as the drug of choice.

4. Scarlet fever. Active immunization with toxin, not recommended except for nurses with positive Dick tests and orderlies assigned to care for scarlet fever patients.

5. Simple toxic scarlet fever (exanthematous stage). Antitoxin recommended in moderately severe to extremely severe cases, when patient is not hypersensitive to horse serum. Sulfanilamide should be used for the prophylaxis of septic complications.

6. Toxic and septic scarlet fever. Antitoxin (globulin concentrated) and sulfanilamide recommended.

7. Late septic complications (postexanthematous stage). Antitoxin of no value. Sulfanilamide to be given.

8. Meningococcal meningitis. Antiserum not generally recommended. It may be used in individual cases. Sulfanilamide is the drug of choice, orally. Lumbar puncture may be done for diagnosis and to relieve pressure.

9. Purulent meningitis. If the cause is not promptly established, chemotherapy with sulfapyridine should be instituted at once. If oral treatment is impossible, sodium sulfapyridine should be given intra-

venously (0.06 gm per kgm of body weight, made up in 5 per cent solution in sterile, freshly distilled water).

Pneumonia

1. Primary pneumonia

(a) Pneumococcal pneumonia. Sulfathiazole is recommended as the drug of choice, together with homologous type anti-pneumococcus serum (preferably rabbit serum).

(b) Hemolytic streptococcal pneumonia, Friedlander's bacillus pneumonia, and staphylococcal pneumonia. For these cases, sulfathiazole is recommended.

2. Secondary pneumonia. Chemotherapy is of doubtful value in the prophylaxis. When complicating organisms (hemolytic streptococcus, pneumococcus, staphylococcus, or Friedlander's bacillus) are believed to be etiologically significant, sulfathiazole should be used.

Gas-bacillus infections. In addition to the usual surgical procedures, polyvalent tetanus and gas-bacillus antitoxin, and sulfanilamide should be used for prophylaxis and active treatment.

Staphylococcal infections. For large carbuncles, boils, diffuse cellulitis, lymphangitis and acute osteomyelitis, sulfathiazole is advised, in addition to accepted surgical procedures. For staphylococcal bacteremia, sulfathiazole should be used, in addition to drainage of the suppurating foci. When possible laboratory control of bacterial chemotherapy should be carried out. Examinations for hemoglobin, total and differential white counts, and a study of the urine for blood should be carried out. Headache and malaise are early toxic symptoms.

"If fever recurs after the patient's temperature has been normal in the course of treatment with sulfanilamide or one of its derivatives, the drug should be discontinued immediately or if recently discontinued should not be resumed unless it has been demonstrated that the fever is due to a recurrence of the infection. Whenever therapy with sulfanilamide drugs is stopped because of a drug reaction, fluids should be forced so that 5,000 cc per day is taken in order to wash out the drug.

"Any patient who has had a toxic reaction to one of the sulfanilamide group of drugs may have a second, and more severe, reaction if one of these drugs is prescribed again. To such patients a small test dose of the drug (0.1 to 0.3 Gm) should be given and the patient observed for twelve hours before intensive therapy is started, following which the patient must be carefully observed and the drug immediately stopped on the first appearance of any toxic manifestation."

J. M. MORA, M.D.

Amies, C. R. The Stability of Tetanus Antitoxin Under Suboptimal Storage Conditions. *Brit M J*, 1941, 1: 709

Under war conditions, it is not always possible to store sera under optimal conditions, hence it is a matter of importance to know the rate at which

antisera deteriorate under suboptimal storage circumstances

As a control the author studied the rate of deterioration of unconcentrated tetanus antitoxin in which 0.35 per cent cresol was used as a preservative. Assays were carried out on guinea pigs at the $L \pm 5$ level the same test toxin being used throughout. Samples were kept at from 2 to 4 C at room temperature and at 37 C for a year. At the end of this time it was found that there was little or no deterioration in the potency of the sera kept near the freezing point. Serum kept at room temperature lost less than 10 per cent of its potency while serum kept at 37 C lost between 40 and 50 per cent of its strength.

As a practical check sera were collected from A R P medical storage centers at the end of two years and checked for potency. In these samples the loss in potency ranged from 8 to 27 per cent and depended on the storage conditions.

It was found further that the freezing of sera had no deteriorating effect on antisera provided that breakage of the container or forcing of the rubber caps had not occurred.

As a general rule anti tetanic sera lose about 10 per cent of their potency per year under average room temperatures. LUTHE H WOLFF M D

Nicoll E A Rehabilitation of the Injured B J M J 94: 501

The principles for the successful rehabilitation of the injured are described by the author who has had extensive experience in a special central clinic receiving yearly more than 6,000 incapacitated workers. Soft tissue and muscle function should be conserved even during the period of immobilization.

In the later stages of rehabilitation disabilities such as contracture, atrophy and fibrosis can be overcome by passive movements and graduated resistance exercises for strengthening selected muscle groups. The pulley and weight apparatus is generally applicable for any group of muscles in the body and also can serve as an instrument for measuring muscle efficiency.

Accessory rehabilitation methods consist of occupational therapy, physiotherapy and remedial games. These include indoor and outdoor forms of progressive activity and are specifically selected for the individual and his injury. Physiotherapy in the form of faradism and deep massage is beneficial in the treatment of localized fibrosis and exudates. Deep massage is more effective when the aponeurosis of the painful muscle is injected first with procaine.

Of a series of 1,200 patients treated with these principles in mind 87 per cent returned to their work and 9 per cent took up light work in the same occupation. B J M G P SHARROFF M D

DeLorimier A A Wartime Military Roentgenology Rad 1 94 36 39

After briefly considering a wartime military roentgenology differs from that of civil practice:

peace time the author discusses the planning required for pre and day field activities in two phases: roentgen requirements near home communities and roentgen requirements in the theater of operations. In connection with the first phase the need and advantages of chest roentgenography and the methods best adapted for it are given detailed consideration.

In order to show how personnel and equipment of the x ray service for military uses fit into the general scheme the disposition of various units is briefly described and illustrated. The most advanced installation in which x ray services will be available is the mobile surgical hospital. Most of the x ray activities here will be fluoroscopic including the localization of foreign bodies. Facilities for superficial x ray therapy are also provided. The equipment and methods deemed most advantageous are described at some length.

In the evacuation hospital it is expected that the same types of equipment will be used as are used for the mobile surgical unit. Most of the work will be fluoroscopic although it is estimated that perhaps 10 per cent of the activities may be roentgenographic. The additional facilities required for the latter are given consideration. The general hospitals are usually of permanent or semi permanent construction and the installations in them will be comparable to those of large institutions in civil practice to meet the varied radiological requirements. Station hospitals provided the professional activities warrant will be equipped similarly to the evacuation hospitals.

In his summary the author states: For the theater of operations the design of equipment has been governed by at least three axiomatic principles: (1) versatility of adaptation to the extent that each piece of equipment will function not merely for a single purpose, but for several requirements and in installations; (2) portability to the extent that disassembly of each item can be easily accomplished and that the component parts can be easily carried; the weight of any one part not exceeding two hundred (200) pounds; and (3) practicality of design to the extent that the equipment can serve the requirements of function in peace time installations as well as in zones of combat.

Applying these principles the combination x ray table unit, x ray machine unit and mobile x ray chassis were designed to provide for a nine way adaptation: (1) horizontal fluoroscopy; (2) foreign body localization by means of a rapid fluoroscopic method; (3) timing fluoroscopy; the design of the x ray tube and screen supports providing for easy and quick shifting for the study of a patient supported in a sitting position on the litter; (4) standing fluoroscopy to the extent of accommodating routine chest studies and all gastro intestinal studies; (5) horizontal roentgenography with conventional focal film distances from 25 to 40 inches; (6) six foot vertical chest studies; (7) six foot horizontal chest studies; the patient lying on a litter upon the floor; (8) ordinary bedside work in the ward by means of

mounting the component parts of the x-ray machine upon a mobile chassis, (g) superficial roentgen therapy, to the extent of milliamperage capacities of 4 and kilovoltage potentials up to 100"

ADOLPH HARTUNG, M D

OPERATIVE SURGERY AND TECHNIQUE, POSTOPERATIVE TREATMENT

Debenham, M The Primary Repair of Tendons
California & West Med, 1941, 54 273

The author reports a survey on the primary suture of tendons, and states that there has been very little written of an exact character regarding the time for primary suture. Certain authors recommend that if the patient is seen within four hours of the time of injury primary suture should be done, but it should not be attempted after twelve hours. The principal objection of those advising against primary suture is that it increases the incidence of infection. The author quotes Boehler, who states that if statistics were available as to primary suture, the incidence of infection would be high. Koch and Mason report that 80 per cent of their cases healed per primam, 10 per cent were infected, and the other 10 per cent had a gross infection following division of the tendons and nerves. The author agrees with several other authors that the most unsatisfactory results are caused by postoperative adhesions in which the tendon, the sheath, and the surrounding soft tissues all enter into the formation of the scar. He believes it is inevitable that adhesions will occur, and that non-union is least often the cause of a poor result. The placing of the suture in the tendon is very important and all surgeons agree that it should extend well away from the cut ends on each side. The author thinks that the "atraumatic technique" suggested by Bunnell would go far toward insuring union.

The local infiltration of novocaine is very widely used, but in those cases in which the operative procedure will last for hours, a general anesthetic is preferred.

A tourniquet makes the operation technically much simpler and the use of a pneumatic cuff around the upper arm inflated to 300 mgm of mercury and another placed around the forearm is recommended. These will compress the muscle bellies of the involved tendons and force the retracted tendon ends into the wound. Hydrogen peroxide may be flushed into the wound and is of some value. The depths of the wound should be lavaged copiously with a gentle stream of normal saline solution and careful debridement should precede any attempt to search for the tendon ends. The author strongly cautions against introducing a clamp blindly into the tendon sheath in search of the tendon, as this will usually produce sufficient trauma to be a major factor in the formation of postoperative adhesions. The method he recommends is to locate the tendon end through a small transverse incision into the sheath proximal to the wound.

The exact location for this second incision can be made by passing a fine silver wire probe up into the tendon sheath, to which the tendon can be attached and then retracted into the wound.

The postoperative care of these sutured tendons varies somewhat and is really a balance between two factors—the strength of the suture line and the formation of adhesions. Probably early active motion within the first few days can be safely accomplished within the limits of pain, but it is unwise to attempt passive motion before the fifteenth day. In Debenham's series the number of poor results increased in direct proportion to the length of time the tendons were immobilized.

PAUL C. COLONNA, M D

Cotta dos Santos, H Some Remarks in Favor of Ricard's Operation Surgical Conduct in Crushing of the Foot (Algumas palavras em favor da operação de Ricard Conduta cirúrgica nos esmagamentos do pé) *Rev med municipal*, 1941, 1 226

The ideal in amputations is to obtain a painless, esthetic stump that can be used without the aid of any apparatus. Unfortunately, this is rarely possible, therefore, Cotta dos Santos reports a case in which he had the opportunity to verify the superiority of Ricard's operation to obtain this ideal result.

A boy, aged twelve years, trying to board a moving train, fell and a wheel passed over his left foot about the level of the middle tarsal articulation. He was operated upon soon after the accident. The crushed portion of the foot was cut off in the line of the lesion, the wound was washed with ether, hemorrhage was arrested, a double piece of gauze was placed over the wound, and three horsehair sutures were introduced to approximate the dorsal and plantar parts of the skin over the gauze without tension. Healing proceeded without incident, but the beginning of equinus, the frequent complication of stumps after Chopart's amputation, could already be observed after eight days, and it became more marked during the following weeks. The equinus was evidently caused by the retraction of the muscles of the calf of the leg in the absence of opposing action by anterior muscles. Two months after the accident when the wound was nearly completely healed, Ricard's operation was performed as follows:

An incision starting 1 cm in front of the external malleolus, running anteriorly over the stump through the granulating surface and ending posteriorly 1 cm below the internal malleolus was made, the astragalus was carefully excised so as to respect the connections of the calcaneus with the tibia and fibula. The calcaneus was introduced into the tibiofibular mortise so that the internal malleolus fitted behind the small apophysis of the calcaneus, and the large apophysis of the calcaneus which protruded in this position of the bone was excised. The skin was sutured, and a horsehair drain was passed through the new joint. The equinus had disappeared and healing was uneventful, forty-five days after the

intervention the patient could walk normally on the stump which was painless and gave solid support on its plantar aspect. The new joint presented a slight passive lateral mobility and the left leg was nearly 2 cm shorter than the right. One month later the patient was seen again; he walked perfectly using an ordinary shoe.

The aseptic evolution of the first intervention seems to suggest that an equally good result would have been obtained if the final operation had been performed at that time. Nevertheless the author believes in the two stage intervention in crushing injuries of a limb: an urgent one to save life and prevent infection, and a purely orthopedic one a few weeks later. The two interventions complement one another and have each a distinct object. The first must be simple and rapid, preferably under general anesthesia and with the use of the Esmarch bandage or a simple rubber tube to insure against loss of blood; it must be as economical as possible and therefore ignore the classical points for amputation. Any idea that the intervention may be less economical in the lower than in the upper extremity must be discarded. The decision as to what to save and what to sacrifice may be very difficult in cases in which there has been no real crushing, but in which there are multiple lesions with considerable attrition of the soft tissues and comminuted fracture. The second intervention is much more delicate than seems to be indicated by the usual term of "re-touching the stump." It is advisable that this second stage be planned in collaboration with the prosthetist who will make the apparatus for the limb as this can only result in benefit for the patient.

In transverse crushing of the foot the author recommends Ricard's astragalectomy as the ideal intervention because it corrects or avoids equinus; it causes only slight shortening of the leg; it allows direct walking on the stump without apparatus; it avoids the necessity of sectioning the Achilles tendon; it provides the possibility of anteroposterior movements in the tibio-calcaneal joint, thereby insuring better walking; and finally in case of failure it still leaves the stump open to other intervention.

RICHARD KEMEL, M.D.

Maes U and Dils H A. Fluid Replacement in Intravascular States with Particular Reference to Transfusion of the Ascitic Fluid. A Clinical and Experimental Study. *A. J. S.* 1944; 4: 453.

The purpose of the authors in this article is to present (1) a study of the abnormal physiological picture which results from loss of water, electrolytes and blood; (2) the technique of fluid replacement; (3) a critical evaluation of blood replacement fluids; and (4) the present status of transfusion of the ascitic fluid.

The indication for fluid replacement fall into four main groups: (1) loss of (1) body water, (2) electrolytes, (3) whole blood and (4) plasma. The causes of dehydration may be divided into two groups: exogenous and endogenous. Among the more im-

portant exogenous causes are voluntary or enforced deprivation of water, excessive sweating due to sunstroke, heat prostration, traumatic shock and surgical operations. Endogenous causes are prolonged diarrhea due to surgical lesions of the intestinal tract, vomiting due to obstructing lesions of the gastro-intestinal tract, and the inability to swallow liquid due to obstructing lesions of the esophagus.

The dehydration causes the skin to become wrinkled and dry, and the mucous membranes lusterless. The eyeballs become soft. As a result of the deficient flow of blood, the extremities are cold. The respirations may be deep and of the "air hunger" type due to acidosis.

Tests which may be applied to the skin and to the blood are the following: (1) standard wheal formation, (2) intradermal salt absorption, (3) intradermal serum absorption, (4) erythrocyte concentration, (5) hemoglobin concentration, (6) hematocrit reading, and (7) determination of the specific gravity of the blood plasma. The response to the administration of water may be determined by (a) the excretion of urine, (b) the time curve of blood clotting, and (c) the rate of oxygen consumption.

The authors' discussion refers only to dehydration uncomplicated by gross lesions of electrolytes or of blood. Minor grades of dehydration may be treated by water administered by the oral or the rectal route. However, many dehydrated patients require treatment with fluids given intravenously.

Surgical causes of the loss of electrolytes are vomiting, diarrhea, discharges from suppurating wounds, prolonged use of Waggstein or Miller Abbott gastrointestinal tubes, the production of artificial openings in the intestinal tract, and prolonged drainage from a biliary fistula.

The degree of electrolyte loss may be estimated by (1) determination of the level of plasma sodium chloride which varies normally from 560 to 630 mgm. per 100 cubic centimeters of blood, (2) determination of the carbon dioxide combining power of the plasma, and (3) determination of the degree of secondary dehydration by means of blood studies: erythrocyte count and hemoglobin evaluation.

The authors have found that an isotonic solution of 5 per cent dextrose with 0.9 per cent sodium chloride provides an excellent replacement fluid.

The immediate effects of hemorrhage are an increase in the heart and respiratory rates, contraction of the spleen and generalized vasoconstriction. Various fluids have been advocated for replacement of blood, fresh whole blood being the most efficacious fluid. Others discussed are crystalline solutions, such as a solution of preserved blood hemoglobin in solution, blood plasma, and serum, and human and calf fluid.

Loss of either the protein or the aqueous fraction may occur and may be acute or chronic. The effects are dependent on the rate of the loss and the nature of the fraction lost. Direct determination of the plasma volume may be carried out by the various

dye methods. Indirect determinations will reveal hemoconcentration with a normal or slightly lower concentration of plasma protein when acute loss has occurred. The authors note that only protein-containing fluids, such as whole blood, plasma, serum, and ascitic fluid, are indicated. In treating hypoproteinemia with transfusions of ascitic fluid, it is not necessary to limit the amount of fluid transfused to 500 c cm. As much as 2,500 c cm may be used within twenty-four hours. Lyophilic plasma, acacia solutions, hypertonic and isotonic solutions of sodium chloride, and desoxycorticosterone acetate are all contraindicated.

HERBERT F. THURSTON, M.D.

Taylor, N. B., and Waters, E. T. Isinglass as a Transfusion Fluid in Hemorrhage. *Canadian M. Ass. J.*, 1941, 44: 547.

The prime requisite in the treatment of shock or in hemorrhage is to fill the blood vessels and thus maintain the blood pressure. Whole blood is, of course, the ideal transfusion fluid but plasma and serum are very satisfactory substitutes. When one considers, however, that in shock or in hemorrhage as much as 2 liters of appropriate fluid may be necessary and must be quickly available, the need for a blood or plasma substitute is evident. A transfusion substitute for blood or plasma must answer the following requirements:

1. The molecule of the dissolved substance must be of such a size that the fluid will not leave the vessels too freely.

2. The solution must exert an osmotic pressure and possess a viscosity approaching as closely as possible that of whole blood; these qualifications depend upon molecular size and shape.

3. It should be as nearly as possible isotonic with the contents of the erythrocytes.

4. It must, of course, be non-antigenic and innocuous in every respect. In addition, it should be readily available, preferably cheap, and capable of being quickly and easily prepared for intravenous administration. Provided it is suitable in the respects just listed, there appears to be valid objection to the use of some fluid other than blood or serum to fill the vessels after hemorrhage.

A solution of ordinary animal gelatin meets all of the requirements except the last. Because of its source it may be infected with anthrax or tetanus bacteria in spite of adequate precautionary measures of preparation. Fish gelatin or isinglass as prepared from the swim bladders of the sturgeon or sea trout obviates all danger of anthrax or tetanus infection. The crude material is relatively cheap, is used in the brewing industry, and when prepared according to the author's method is non-toxic in dogs.

It is stored in a dry state and made up for use immediately before transfusion by the addition of normal saline solution and 2.5 per cent sodium bicarbonate; a 7 per cent solution is used. The fate of isinglass after its introduction into the body is not fully known, however, unlike acacia, it is not taken

up by the liver, but is probably broken down and metabolized by body tissues.

The molecular weight of gelatin varies from 10,000 to 96,000 and a 7 per cent solution has an osmotic pressure of 38 mm of Hg. This is considerably higher than that of plasma with a pressure of from 25 to 30 mm of Hg. The viscosity of this solution is about three times that of plasma, but only one-half that of whole blood. A 7 per cent solution does not gel at room temperature.

Fifteen dogs under ether anesthesia were bled from the femoral artery during one-half hour periods, and from 35 to 63 per cent of the calculated blood volume was lost. The average drop in the blood pressure varied from 80 to 100 mm of Hg. From 50 to 70 per cent of the quantity of the blood lost was replaced by a 7 per cent solution of isinglass, given slowly. Eleven of these dogs recovered completely, the 4 others recovered from the anesthetic and lived from three to twenty-one hours. Of 15 control dogs which were bled the same way, but more slowly, 11 died in periods ranging from one to ninety minutes, 1 lived seven hours, and 3 recovered completely.

In general, isinglass is non-antigenic, but mild antiphylaxis could be produced within fourteen-day intervals following a large transfusion. There was no evidence of sensitization after a three-week period. This sensitivity was believed to be due to fish-protein contamination and not to the gelatin itself. Such contamination could probably be removed by more vigorous purification.

The authors believe that 7 per cent solutions of fish-gelatin transfusions were definitely life-saving in dogs that had lost as much as 52 per cent of their circulating blood volume. Without these transfusions the animals would have died. No comment was offered as to the advisability of human trial.

HOWARD A. LINDBERG, M.D.

Rowlands, R. A., and Wakeley, C. P. G. Fat Embolism, 2 Fatal Cases, A Case with Recovery, Etiology, Mechanism, Post-Mortem Appearance, Symptoms and Physical Signs, Differential Diagnosis, Treatment. *Lancet*, 1941, 240: 502.

The authors state that war wounds often cause simple or compound fractures of the bones and widespread laceration of the subcutaneous and other fat-laden tissues; hence, fat embolism would be a likely complication. Three cases are reported, 2 confirmed by autopsies, and a third, in which the clinical course justified the diagnosis and the patient recovered.

The incidence of fat embolism is 8 times more frequent in men than in women, and most common during the third or fourth decades of life. It rarely occurs in children under the age of fourteen.

The causative factors of fat embolism are summarized as traumatic and non-traumatic. The traumatic group includes injury to the osseous system by fractures jarring of the skeleton or orthopedic operations and trauma to subcutaneous and intermuscular fat and fatty viscera, including injury

by burns. Classified as dubious are such non-traumatic factors as certain poisons, diabetes, the injection of oily substances, eclampsia, and childbirth. The greatest number of the traumatic cases follow fractures of the long bones and especially of the lower limbs. The degree of comminution bears no relation to its incidence.

Three conditions are considered necessary for the absorption of the fat into the circulation at the site of the injury: rupture of the connective-tissue cells liberating the fat; rupture of neighboring blood vessels providing a portal of entry; and some other factor causing the free fat to pass into the circulation. The first two of these conditions are present in fracture of the long bones.

Fritzsche found that ligation of the veins of an injured limb did not prevent the occurrence of pulmonary fat embolism. Most authorities however believe that lymphatic absorption does not play any real part in the causation of fat embolism.

The capillary bed of the lungs is the first obstructive area to fat after absorption into the blood stream. The lungs are capable of accommodating large numbers of fat emboli and only in severe cases does embolism obstruct pulmonary circulation.

The authors discuss three main clinical types: viz. pulmonary fat embolism, systemic fat embolism, and a cardiac type. Two varieties of pulmonary fat embolism are recognized. In one of these a few hours after trauma large amounts of fat are absorbed rapidly, flood the pulmonary circulation, and the patient dies suddenly with clinical signs of acute edema of the lungs. The other type develops more slowly, usually three or four days after the accident.

The physical signs are as follows: the cerebrospinal fluid in uncomplicated cases shows no abnormality except slightly increased pressure. The patients are usually pyrexial; the temperature is usually about 103° F but may vary from subnormal to 107° F. Tachycardia is always present and increases with the pulmonary congestion and cerebral involvement. The skin and mucous membranes often show petechial hemorrhages at the time of the stupor. Quantitative estimations of fat in the blood are beyond the ability of the average part-time chemist to carry out accurately. The kidneys are involved in most cases of fat embolism.

The diagnosis is made on the history of injury and the onset of typical clinical manifestations usually within the first three days after the injury. As a rule there is increasing pyrexia, tachycardia, and dyspnea with crepitations over the lungs and petechiae over the upper part of the chest followed by restlessness, insomnia, delirium, stupor, and coma, with no focal neurological signs. There will be roentgenological changes in the lungs: a rapid decrease in the percentage of hemoglobin and possibly fat globules in the urine.

Suggestions advanced for the treatment of fat embolism are mainly palliative or empirical. The following prophylactic measures are mentioned:

Unnecessary or rough handling of patients should be avoided; all fractures should be reduced early and splinted immediately; manipulations should be as few as possible if the condition of the patient permits; he should be propped up in bed.

Saponifying or emulsifying the fat by the intravenous infusion of a 2 per cent solution of sodium bicarbonate with admixtures of large quantities of intravenous saline solution to wash the emboli through the capillaries have been suggested. Subsequent experience does not support either of these therapeutic measures. The administration of cholic and desoxycholic acid even in the smallest doses caused hemolysis. The administration of sodium desoxycholate intravenously in doses of 10 c.c. of 20 per cent solution given very slowly in a drip infusion every two hours has been advocated. The latter treatment is in the experimental stage. The administration of oxygen is helpful.

In concluding the authors state that in fat embolism many more observations are needed on the morphological, physical and chemical condition of the blood and cerebrospinal fluid, electrocardiographic and pulmonary roentgenological changes demand careful study. Further observations should be made on the effect of high concentrations of oxygen and on methods which will increase the emulsifying power of the blood and hence diminish the size and obstructive power of the fat globules in the capillaries. HERSEY F. THURSTON, M.D.

ANTISEPTIC SURGERY TREATMENT OF WOUNDS AND INFECTIONS

Key J. A. The Early Operative Treatment of Acute Hematogenous Osteomyelitis. *Surgery* 94: 9657.

In a concise article the author gives his reasons for advocating early and adequate drainage of acute hematogenous osteomyelitis and outlines his method of treatment. The staphylococcus is the organism involved in 90 per cent of the patients over two years of age. The human being is not able to develop much general immunity to this organism which has a tendency to invade the blood stream and produce septicæmia and metastatic abscesses according to the number of organisms involved.

The primary focus usually is unimportant. The organism enters the bone from the blood stream. The initial effect of the organism must have been small or septicæmia or multiple primary abscesses would have occurred. Since the entry of the bone contains no sensory nerves, local symptoms do not occur until the inflammation has reached the periosteum. General symptoms arise from the absorption of toxic products. The general and local symptoms usually occur at the same time, therefore a considerable amount of tissue must be involved and it is probable that the disease has been present from two to five days or longer before clinical symptoms appear. Because of the difference in rate of local inflammation in the rigid non-expandable bone

SURGICAL TECHNIQUE

results in more rapid and extensive necrosis than in soft tissues. The author attributes the frequency of septicemia and the excessive toxemia to the increased pressure generated within the shaft which forces the organism into the blood stream. Because the usual walling-off is hindered, he believes the toxemia will persist until drainage is instituted.

Treatment begins with full doses of sulfathiazole given by mouth or sodium sulfathiazole given intravenously. Usually from eight to twelve hours are sufficient to correct exhaustion and dehydration. The extremity should be immobilized during this period. If the patient is extremely toxic, large doses of staphylococcus antitoxin should be given. Gentle handling of the patient before and during operation is essential. Incision should be made by the most direct route, be ample but not excessive, and be made with the least jarring possible. Regardless of whether pus is encountered after incision of the periosteum, the medulla of the bone should be opened. The author uses a sharp osteotome or drills a number of holes and connects them with a sharp osteotome, according to the thickness of the cortex. No attempt is made to remove necrotic bone. The wound is sprinkled generously with powdered sulfathiazole and packed with vaseline gauze, and the limb is immobilized by cast, splinting, or traction. Post-operative blood transfusions and antitoxin are given if indicated.

He believes this treatment will decrease mortality, prevent chronic osteomyelitis, and lessen joint injury, secondary foci, and the amount of bone destruction at the primary focus.

In patients under two years the treatment is the same except that operation is usually delayed until an extra-osseous abscess develops. Because the infant bone has large canals and relatively little organic matter, infection acts much as an infection in soft tissue. An extra-osseous abscess forms early and may be opened and drained without disturbing the bone. Because the infant bone is porous, that portion killed tends to be absorbed without sequestration. About 50 per cent of the cases in infants are caused by streptococci, and these infections tend to heal without sequestra. MARIAN BARNES, M D

Wilson, J C. The Delayed Operative Treatment of Acute Hematogenous Osteomyelitis. *Surgery*, 1941, 9 666

The author summarizes a study of 33 cases of acute hematogenous osteomyelitis occurring in children admitted to the orthopedic wards of Children's Hospital, Los Angeles, since 1935. The ages ranged from seventeen months to twelve years. Thirteen children were female, 20 male. There was a history of previous furuncles in 4 cases, urinary infection in 9, superficial infection such as blisters, scratches, and splinters in 5, impetigo in 2, otitis media in 1, chicken pox in 1, and laryngitis in 1. The remaining 10 cases gave no history of a previous lesion which might have been construed as the primary source of infection.

The staphylococcus aureus was the causative organism in 27 cases, the streptococcus in 5 cases, and the staphylococcus citreus in 1 case. The staphylococcus aureus was recovered from the blood stream of 17 patients, and the streptococcus from 2. In 30 the primary bone lesion was in the lower extremities, in 3, in the upper extremities.

The author divides the patients into four groups. Group 1 consisted of 8 patients whose lesions were drained in the first seven days of their illness. There was 1 metastatic lesion and 1 death in this group. In Group 2 there were 18 patients whose lesions were drained the seventh to fourteenth day. There was 1 metastatic lesion and there were no deaths in this group. In Group 3 there were 3 patients whose lesions were drained the fourteenth to twenty-first day. There was one metastatic lesion and no death. Group 4 consisted of 4 patients who received no drainage. Three drained spontaneously. The fourth was moribund on admission and died the following day of bronchopneumonia.

The author believes that the patient with acute hematogenous osteomyelitis is "a patient with septicemia who develops an abscess within the substance of the bone," and that drainage should not be done until the location of the focus can be determined with some degree of accuracy, and there is reasonable evidence that pus is present.

He believes that drug therapy is invaluable in letting the surgeon choose the optimum time for operation. Chemotherapy should not be used until the type of invading organism is determined, then sulfanilamide is used in streptococcal infections and sulfathiazole in staphylococcal. He warns against a false sense of security when the toxic symptoms subside under drug therapy. Roentgenograms of progressive bone changes in three children whose toxic symptoms subsided under chemotherapy and transfusions are reproduced in the original article.

In 17 of the patients the bone lesion healed. Eight cases still show drainage from the wound but some of these are recent cases and healing is expected in at least half of them within six months. Five patients have disappeared and the results are unknown. MARIAN BARNES, M D

Hooker, D H., and Lam, C R. Absorption of Sulfanilamide from Burned Surfaces. *Surgery*, 1941, 9 534

The authors relate their experiences in applying sulfanilamide on freshly burned areas. They sprinkled the dry powder on small areas in 8 cases. The rapidity of absorption and the high blood levels obtained were striking. Their experiments give evidence pertaining to the debated question of whether or not there is considerable absorption of diffusible material from burned skin.

Five grams of powder were applied initially and small amounts added later, which made a total of about 40 gm. over a period of three and one-half days. The curve of the blood sulfanilamide reached a level of 9.4 mgm but no infection developed.

The authors do not advise the widespread use of sulfanilamide in the treatment of burns. There is too much danger of overdose. It would appear to be useful in case of a large infected burn to put the powder on a small portion and to obtain the desired blood level by this route rather than by mouth.

The authors experience additional evidence pointing against the view that burned tissues form a poor absorbing surface.

HOWARD A. MCKENNEY M.D.

ANESTHESIA

Perleman I. M. and Bernstein V. S. The Use of Sovcaine for Local and Spinal Anesthesia. *Vol. 44 No. 48* 1941 48 179

The drawbacks of the popular local anesthetics viz short duration of action and secondary pains have been overcome by synthesis of new products such as pantocaine and nupercaine.

The new anesthetic sovcaïne synthesized in Soviet Russia is less toxic than nupercaine and produces an anesthesia of from six to eight hours duration. It can be used for local as well as spinal anesthesia and causes no secondary pains following the operation.

The authors use a 0.5 per cent solution in distilled water without adrenalin for local anesthesia and from 0.3 to 0.6 c.c. of a 1 per cent solution for spinal anesthesia. Neither the local nor the spinal anesthesia causes a fall of the blood pressure and not infrequently the latter rises from 80 to 90 points after the use of the new anesthetic.

However to play perfectly safe the authors recommend a subcutaneous injection of 1 c.c. of a 5 per cent epinephrine solution one half hour before the spinal anesthesia. A pre-operative injection of morphine is advisable.

The new anesthetic is suitable not only for operative procedures but also for the reduction of fractures and dislocations.

JOSEPH E. NARAT M.D.

Lemmon W. T. and Paschal G. W. Jr. Continuous Spinal Anesthesia. *Perfusion* 1941 44 975

Lemmon and Paschal report their observations on continuous spinal anesthesia in their first 500 cases.

By this method anesthesia is maintained as long as desired by adding subsequent small doses as they are needed—a fractional dose method.

In every instance anesthesia was produced to the desired level and degree and in each case the operation was completed under spinal anesthesia. Supplemental anesthetics were not needed. There were no anesthetic deaths and no neurological complications. Toxic symptoms were promptly controlled by withdrawal of the drug (novocaine) by rapid aspiration of spinal fluid and by giving oxygen inhalations.

For preoperative medication nembutal (3 gr) is given the preceding evening and three hours before operation. Morphine sulfate (1 gr) and scopolamine hydrobromide (1/100 gr) are given an hour before operation. If added sedation is desired additional small doses of morphine are given during the operation.

The average age of the patients for the series reported was thirty-nine years, the average length of operation fifty-three minutes and the average total dose of novocaine 4 mgm. Blood pressure fluctuations were much less marked than in other methods of spinal anesthesia, the average fall in systolic pressure being only 14 points. Headache occurred in 25 per cent of the cases, urinary retention in 31 per cent and lung complications in 38 per cent.

The technique is described in detail.

J. M. MOORE M.D.

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Nowell, S. Increasing Density of the Renal Shadow During Excretion Urography, A Sign of Acute Ureteric Obstruction *Brit J Radiol*, 1941, 14 138

During the past few months, the author observed 3 cases in which excretion urography resulted in a progressive increase in the density of one kidney shadow during the course of the examination. These 3 cases are briefly presented and their roentgenograms reproduced. They all had a demonstrable stone in the ureter of the corresponding side. Two of the cases were re-examined by excretion urography one, about four weeks after the stone had passed, when it had a normal roentgenographic appearance, and the other, five weeks after the first examination, which then showed hydronephrosis and hydro-ureter down to the calculus, which had now descended to the level of the lower ureteral orifice.

After a brief review of the literature, the author tries to harmonize his own observations with those of other investigators, such as Wesson and Fulmer, Wilcox, Dourmaschkin, and Narath, and arrives at the following conclusions:

1. An acute obstruction of one ureter may cause a progressive increase in density of the corresponding kidney shadow, during excretion urography.

2. This increased density is due to the contrast medium being concentrated and remaining in the uriniferous tubules as a result of the pressure of the dammed-up contents of the renal pelvis.

3. On the cessation of the acute phase the pelvis and calyces will be demonstrated by the dye during excretion urography.

4. After one or more of such acute phases a hydronephrosis may occur, and conversely, an acute phase may occur in a case with a previously hydronephrotic kidney.

It is the author's view that the increasing density of a kidney shadow during excretory urography may be diagnosed as ureteric obstruction and, with certain reservations, as a differential sign from acute right-sided abdominal lesions. T. LEUCUTIA, M.D.

Masserini, A. Roentgen Aspects of Giant-Cell Tumors of the Bones Treated with Roentgen Irradiation (*Aspetti radiografici dei tumori giganto-cellulari delle ossa trattati con roentgenterapia*) *Radiol med*, 1941, 28 84

Although the literature of the past twenty years contains many works on giant-cell tumor of the bones, it offers relatively few roentgenological data on the changes which occur during roentgen treatment and on the final aspect of the bone when clinical cure of the pathological process can be accepted. And yet, roentgen observation is important because it reveals whether the tumor responds to

irradiation or not, and, in the latter case, allows timely use of surgical intervention to eliminate the possible danger of malignant degeneration. Masserini describes the roentgen aspect of 5 irradiated cases which he has had under observation for several years.

Investigation of the behavior of giant-cell tumors shows that as long as the process remains active it tends to destroy the bone, which it replaces by the characteristic giant-cell tissue, and to increase the size of the bone, when the process is arrested spontaneously or by roentgen treatment, the changes stop but do not regress. Therefore, it is never possible to determine clinically when the disorder is arrested or cured, especially as the subjective condition of the patient does not offer any help. Rupture of the cortex and tumoral invasion of the soft tissues, which constitute favorable conditions for clinical control of arrest or improvement of the process, occur rarely. On the other hand, the problem may be complicated by a sudden exacerbation or by malignant transformation of the tumor. In opposition to these difficulties, which inevitably confront the physician, stand the relative facility and reliability of the roentgen investigation.

The study of the present cases shows that rather typical and nearly always demonstrable roentgen pictures correspond to the evolution of the tumor toward improvement or cure. Careful comparison of the films taken during and after irradiation reveals in the trabeculae and in the cortex certain changes which gradually become more distinct. There is a process of recalcification consisting of an increase in the thickness and opacity of the remaining cortex and of the internal trabeculae, and, at times, a filling of the transparent spaces of the tumor by bone tissue rich in calcium salts. The final result may be the roentgen aspect of solid bone and even of complete and intense eburnation. The form assumed by the bone during the disease is in general not changed by healing. If the process has ruptured the cortex and invaded the soft tissues, calcification takes place in the latter. These changes occur with extreme slowness: control films taken after two and three years, and even later, show new signs of further improvement in the recalcification. On the other hand, at the end of the radiation treatment it is impossible to find with certainty any favorable change in the roentgen picture of the tumor. Instead, as happened in one of the present cases, a temporary aggravation may be observed. This is known as the paradoxical phenomenon of Herendeen and consists of further decalcification of the cortex and neoplastic structural framework, and of a tendency of the tumor to spread to the neighboring tissues, associated with a return of the subjective clinical symptoms. However, the absence of immediate signs of improvement or the presence of Herendeen's reaction is no reason to

doubt the efficacy of the roentgen treatment. It imposes vigilant observation and requires that the possibility of a new series of irradiations be kept in mind.

RICHARD KESSEL M.D.

Hansson C. J. Arthrographic Studies on the Ankle Joint. *Acta orth. 1941; 2: 281.*

Arthrographic studies were made of 48 ankle joints. After the usual lateral and frontal roentgenographs had been made and after anesthesia had been produced by novocain 3 ccm of 35 per cent perabrodil were injected in the frontal area of the joint immediately on the inner side of the medial malleolus. If the joint was much distended by intra-articular hemorrhage as much blood as possible was withdrawn and 6 ccm of perabrodil were injected. The arthrograms were made immediately after a few movements of the joint. Frontal and lateral roentgenographs were made with the foot in positions of extreme abduction and adduction. No discomfort was noted by the patients other than a slight burning pain in the soft structures in cases in which leakage from the capsule or syndesmosis had occurred; this disappeared in about an hour.

The various types of injuries which were observed are catalogued and their frequency noted. In 3 instances there had been old injuries and ligamentous insufficiency was found on the lateral aspect of the ankle joint with leakage to the tendon sheaths of the peroneus muscles. In 4 cases the arthrogram was normal with the exception that there was leakage from a tendon sheath to the sheath of the posterior tibial muscle. Two of these represented old and 2 were recent injuries. Rupture in the capsule and ligaments on the lateral side of the joint with leakage of the contrast medium into the soft structures was found in 7 cases; these were all recent injuries. Ligamentous insufficiency or rupture on the medial side found in 4 cases was associated with rupture of the syndesmosis in 2 instances. Two cases were old and 2 were recent injuries. A connection between the talocrural joint and the posterior talocalcaneal joint was found in 2 cases of old and 2 of recent injury. In 1 instance of recent injury leakage of the contrast medium occurred through



Fig 1

fractures out into the normal structures. Normal arthrograms were obtained in 26 cases.

This article is well illustrated. Figure 1 demonstrates rupture in the capsule and ligaments on the lateral side of the ankle joint with leakage of contrast medium into the soft structures. Figure 2 demonstrates a rupture on the medial aspect of the ankle joint associated with leakage into the soft tissues in a patient who also had a fracture of the distal end of the fibula. HAROLD C. OCHSNER M.D.

Fray W. W. Roentgen Manifestations of Arteriosclerosis of the Branches of the Abdominal Aorta. *Calcification of Branches of the Celiac Axis.* *Radiology 1941; 36: 439.*

It is the purpose of this article to show how varied the roentgen picture may be in connection with calcification of the arteries in the left upper quadrant and to suggest the means by which a correct diagnosis may be made. Anatomical details of the various vessels commonly undergoing calcification are presented. Detailed case histories are cited of patients presenting various types of calcifications. The cases have been divided as follows: (1) cases showing multiple ring or tubular shadow; (2) cases showing multiple crescentic or curvilinear shadows; and (3) cases showing single ring, tubular, crescentic or curvilinear shadows.

In his discussion the author states that the recognition of the shadows described as evidence of advanced arteriosclerosis of the celiac axis—a diagnosis frequently missed—is not difficult if the common variations in the shape of these calcifications and the usual location of the shadows on the abdominal film are kept in mind. He also calls attention to the value of roentgen examinations in the lateral projection in differentiating the shadows from urinary concretions or other questionable lesions.



Fig 2

The following conclusions are made

1 Calcification of the arterial walls of the celiac axis is frequently observed in elderly subjects

2 The location of the shadows is typically over the left upper quadrant, the proximal branches lying at the level of the dorsolumbar junction while the more distal branches vary widely, shifting in position with the organ supplied

3 The calcification produces shadows of diverse shapes, varying from short crescents to complete rings Straight plaques alone are rarely observed

4 While the branches of the celiac artery serve the organs of both upper quadrants, calcification over the right upper quadrant (hepatic branch) is rarely identified

5 Over the left upper quadrant the calcification is commonly multiple, a score or more lesions being observed in one of the series

6 A calcified aneurysm may be identified under favorable circumstances

7 Identification of these shadows is important, since diagnostic confusion may lead to needless instrumental procedures in some instances, and in rare cases of ruptured aneurysm a missed diagnosis may postpone a needed operation

ADOLPH HARTUNG, M D

Yunich, A M, and Crohn, B B Atypical Regional Ileitis, Roentgenological Limitations *Am J Digest Dis*, 1941, 8 185

In the majority of cases of ileitis the disease can be diagnosed from the history, and this diagnosis can be confirmed roentgenographically without difficulty A small group of cases, however, because of atypical clinical or roentgenological features, presents interesting diagnostic problems The greatest problem was presented by those early cases with a good clinical picture but with negative or insignificant roentgenographic changes In certain cases atypical clinical features have befogged the issue in others, misinterpretation of roentgenographic findings (error of commission) has led to faulty conclusions in others, the lack of roentgenographic confirmation of the disease (error of omission) has left the maker of a provisional diagnosis in the lurch

A number of case histories illustrating the various reasons for errors in diagnosis are presented in detail with comments as to how they might have been obviated The authors believe that diagnosis on purely clinical grounds is warranted and that when made, exploratory laparotomy should be insisted upon, even when there is insufficient roentgenographic corroboration

ADOLPH HARTUNG, M D

De Araujo, A, and Osborne, C Roentgen Therapy in Scapulohumeral Periarthritis (Da radio-terapia na peri artrite escapulo humeral) *Rev brasil de orthop e traumatol*, 1941, 2 235

Having had very good results from deep roentgen therapy in deforming arthrosis and arthritis, the authors decided to try this method of treatment in scapulohumeral bursitis and periarthritis

They give case histories illustrated with roentgenograms of 14 cases in which this method was used They found the results better than those of any of the other methods which they had used previously Pain which was the most troublesome symptom was almost always overcome in 2 treatments Three or 4 treatments were given in all the cases except 1 particularly stubborn one, in which 6 treatments were given the individual doses in this case were larger and it was the only case in which good results were not obtained The opaque calcified nuclei around the joint either disappeared in all the other cases or were greatly reduced in size

Irradiation was given over two fields, one anterior and one posterior, and occasionally another lateral field was used The fields were 8 by 8 cm in size A dose of from 100 to 120 roentgens was given once or twice a week The length of each treatment varied from six to twelve minutes The technique used was 180 kv, 5 ma, filter 0.50 mm of copper and 2 mm of aluminum The focus-skin distance was from 35 to 40 cm, the shorter distance being preferred

AUDREY G MORGAN, M D

Warren, S The Radiosensitivity of Tumors *Am J Roentgenol*, 1941, 45 641

The author, in considering the radiosensitivity of tumors, somewhat arbitrarily places them in three groups (1) radiosensitive tumors which regress strikingly or disappear clinically with a total dose of 2,500 roentgens or less of protracted radiation (2) radioresponsive tumors which require from 2,500 to 5,000 roentgens for similar regression, and (3) radioresistant tumors which require over 5,000 roentgens for response In the first group the dosage given rarely causes appreciable damage to normal tissue in the second group the normal tissue shows definite reaction but recovers without severe permanent injury, and in the third group damage to the normal tissue may equal or even exceed that done to the tumor

Radiosensitivity and radiocurability are not synonymous Tumors that metastasize readily may prove incurable in the end despite their radiosensitivity Moreover, radiosensitivity is not necessarily a permanent, unchanging characteristic of a tumor The metastasis from a radioresistant tumor, for example, may appear quite radiosensitive On the other hand, there is a marked tendency for recurrences to be more resistant to irradiation than was the initial tumor

Radiosensitivity does not depend on the tumor alone, but is affected as well by the character of the supporting tissue, its degree of vascularity, and even by the presence or absence of infection While it may be said, generally, that the less the differentiation of the cells, the greater the radiosensitivity of a given tumor, and *vice versa*, this is not always correct Therefore, the histological grading of malignancy, although of some assistance in estimating radiosensitivity, is not of great practical applicability

The author instead of merely cataloging the various tumors according to their degree of radiosensitivity considered examples of different types of response paying special attention to those concerning which there is some disagreement as to the criteria of the radiosensitivity.

Such examples in the first group are myelogenous leucemia and the rather heterogeneous lymphomas in the second group the basal carcinomas of the skin epidermoid carcinomas of the cervix uteri and carcinomas of the larynx and in the third group carcinomas of the breast carcinomas of the stomach and the malignant melanomas of the skin.

In selecting these rather varied types of tumors for discussion the author from experience gained in the post mortem and operating rooms aims to stimulate further observation and experimentation to finally settle the question of best therapeutic approach.

T. LELCUTIA M.D.

Ahlbom H. E. The Results of Radiotherapy of Hypopharyngeal Cancer at the Radium Institute Stockholm from 1930 to 1939. *Acta Radiol.* 1941 22 155.

At the Radiumhemmet all carcinomas situated in the external portions of the larynx and in the hypopharynx are regarded as hypopharyngeal cancer. No distinction is made between extrinsic and intrinsic laryngeal cancer on the one hand and hypopharyngeal cancer on the other. The borderline between larynx and hypopharynx is drawn at the laryngeal inlet. Also included in the hypopharyngeal lesions are those carcinomas which show a fusiform growth with the center about the level of the transition between the hypopharynx and esophagus.

The series of cases of hypopharyngeal cancer studied by the author had been seen over a period of ten years and included 129 women and 103 men. The author regards sideropenia as the predisposing factor in the female patients practically all of whom had postcricoid lesions. In male patients the lesions were in the sinus pyriformis the aryepiglottic fold the posterior arytenoid regions and on and around the epiglottis. Most of the male patients were chronic alcoholics and heavy smokers.

Small relatively well demarcated tumors without lymph node metastases or with an occasional small metastasis were treated with telecobalt therapy while the more extensive lesions were treated with roentgen therapy. There has been much variation in the telecobalt treatment technique. The usual type of treatment has been irradiation of two fields on each side of the neck with from 3 to 5 gm. of radium for an hour and a half to two hours daily. The total dosage is not given but the author states that a scaling or partly all exudative dermatitis usually developed in about three weeks. Telecobalt therapy was also used to supplement previous roentgen therapy.

There has been a considerable variation in roentgen therapeutic methods in the series studied. After 1936 three fields were usually treated one on each side and one on the back or front of the neck. The

technical factors were 70 to 180 kV mm. of copper plus 1 mm. of aluminum or thoraeus for filter from 50 to 60 cm. of distance and an intensity of from 20 to 30 roentgens per minute. From 150 to 400 roentgens measured with back scatter were given to one field daily. A total tumor dose of from 5000 to 6000 roentgens was usually given over a period of from twenty to thirty days. From two to four weeks after the beginning of the treatment an epithelitis with a fibrinous coating appeared in the mucous membrane of most patients. In the majority only a dry epidermitis or exudation developed in the field of treatment and this healed in from one to three weeks.

Of the 291 cases of hypopharyngeal cancer treated 56 or 19 per cent were not treated by irradiation. The results of treatment in the irradiated group of 235 cases are: cure with absolute healing in 6 per cent after five years. The patients treated with telecobalt therapy were free of signs and symptoms after five years while roentgen therapy gave five year cures in about 5 per cent. Of the relatively few cases which came to autopsy 10 showed no cancer in the throat or in the lymph nodes of the neck.

The total tumor dose over a certain number of days appears to be the factor of decisive significance in irradiation of hypopharyngeal cancer. The cases which remained cured for three years or more are practically all in the group which received from 5000 to 6000 roentgens over a period of from twenty to thirty days. Only palliative results were obtained in the cases which were given a smaller amount of irradiation. A strikingly large number of the patients who had received larger doses died during or immediately after the mucous membrane reaction from the treatment.

The author concludes that the optimum roentgen treatment of these lesions is from 1000 to 2000 roentgens to a posterior port and from 3000 to 3200 roentgens to each of two lateral ports in daily increments of from 325 to 350 roentgens.

HAROLD C. OCHS, M.D.

Stone R. S. and Robinson J. M. Roentgen Irradiation of the Cervix in Carcinoma of the Cervix Uteri. *Radiology* 94 365.

In this article the authors present the details of the present manner of treatment in carcinoma of the cervix uteri together with their reasons for adopting the technique now in use. They maintain that irradiation of the neoplasm requires knowledge not only of the site of the primary lesion but also of all of the structures to which it may spread. A complete investigation including gynecography ought to precede plans for treatment.

If the lesion in the cervix is small and well localized the first treatment with radium is given immediately after the biopsy and a complete course of radium therapy is carried out. If the growth has been classified as of Stage I or early Stage II (Schmitz) and the patient is a good operative risk a Wertheim operation is then performed. Otherwise a course of x-ray therapy follows the radium therapy.

If, however, the growth is bulky and extensive, the course of x-ray treatments is given first. This is followed in from two to six weeks, according to the condition of the patient, by radium therapy. The purpose of using the x-rays first is to decrease the size of the lesion so that the radium can be applied more effectively. The radium therapy is considered the principal method of treatment of the primary lesion. The beam of roentgen rays is not aimed at the cervix, but at the probable regions of extension and metastasis. The location and size of the fields to be used and the direction of the beam depend, therefore, on the location of those structures beyond the reach of the gamma rays which are likely to be involved, namely, the lymph channels, lymph nodes, parametrium, and vagina. A detailed anatomical description of these structures is included together with the most likely course of metastatic extension is apt to follow as reported by various authors.

As regards the technique used, individual findings determine the actual details. Routinely, two fields anteriorly and two posteriorly are employed. When the patient is more than 20 cm in thickness, right and left lateral fields are usually added. When 200 kV x-rays are used, the standard daily dose is 200 roentgens in air to an anterior and a posterior port on the same side of the pelvis one day, and to the ports on the opposite side the next day. When lateral ports are used they are usually treated every third day. The treatments are continued daily except Sundays and holidays, the ports being rotated in the manner mentioned, until each port has received 1,900 roentgens. If it is judged that the patient can tolerate more, treatment is continued until a dose of 2,300 or even 2,700 roentgens has been directed to each port.

With the 200 kV constant potential apparatus, a filter of 0.5 mm of copper plus 1.0 mm of aluminum is used, and the half-value layer in copper of the rays is 1.05 mm. The rate of administration is 21.3 roentgens per minute, and the distance 80 cm. When the 1,000 kV Sloan high-frequency apparatus is used, the quality of the radiation changes to 0.5 mm of copper half-value layer, and the rate to 25 roentgens per minute. The distance remains the same. From 300 to 325 roentgens in air are given, and treatment is carried to totals of between 3,250 and 3,750 roentgens.

For the last two years the right side of the pelvis of each patient has been treated with 200 kV radiation and the left side with 1,000 kV radiation. This was done for the purpose of comparing the reactions in the skin produced by the two qualities of radiation and has been reported. Some of these patients have had Wertheim operations and some have had removal of the pelvic lymph nodes. The gynecologists have been unable to determine any difference in the reactions of the intrapelvic tissues to the different qualities of radiation.

Detailed discussion of the rationale of the technique used is included and reasons are given for variations from procedures reported by others. The

results obtained are given consideration only insofar as technical factors are involved.

ADOLPH HARTUNG, M D

RADIUM

Kaplan, I I. Radium-Beam Therapy. *Am J Roentgenol*, 1941, 45 683

In 1930 Bellevue Hospital, New York, New York, was supplied with a 5 gm radium pack. Its original construction was described the following year. Since then several changes had to be made to decrease the stray radiation received by the operator without sacrificing the flexibility of the pack. Braestrup recently designed a remote control arrangement, which is described and illustrated in the original article. This arrangement permits the removal of the radium by means of a flexible metal conveyor chain behind a 3 cm lead block when not in use. The chain is operated by an electric motor controlled from the operator's position by a push-button system. The treatment with the pack is given in a specially constructed lead-lined room, the operator being outside behind a lead barrier and observing the patient through a lead window. After the holder is positioned for treatment, the operator moves outside of the treatment cubicle behind the lead barrier and only then is the radium automatically placed into the exposure portal by means of the remote-control arrangement. The apparatus includes an electric timer so that at the end of the treatment, the radium is again automatically brought back into a position of safety behind the 3 cm lead block.

Various other features are incorporated in the new pack arrangement which are briefly described. Of particular interest is the distribution of the radium tubes by having them form an arc with a radius of 11 cm and the center of the arc falling 5 cm below the skin, which is the average depth of the lesions treated with the pack. Since there are 100 radium tubes altogether, they are placed in two layers in such a way that the lower tubes do not shadow the upper tubes at the depth of from 4 to 8 cm, although at the surface the intensity from the upper tubes is reduced somewhat. The result of this arrangement is a greater depth dose.

The clinical dosage was worked out on an empirical basis. It was found, for example, that a daily dose of 5,750 mgm-hours over an 8 by 10 cm portal and at a 6 cm radium skin distance produces cutaneous and mucosal reactions equivalent to those obtained with a daily dose of 400 roentgens produced by 200 kV with a 0.5 mm copper screen with backscattering. As a whole, the gamma rays of radium produce certain biological effects with a smaller physical dose than is required of the roentgen rays. This is an advantage of the radium-beam therapy. It has also been observed that the gamma erythema appears at a much later date and lasts longer than the roentgen erythema, although severe second and third-degree reactions occur at approximately the same time.

In planning treatment with the pack the aim is to deliver as adequate and homogeneous irradiation as possible. Although very large doses can safely be administered in some unfortunate instances necrosis did occur especially when the primary carcinoma was associated with infection.

The total number of cases treated with the radium pack during the past five years amounted to 447 with all types of malignancies included. Ten of the more representative cases are briefly reviewed and 3 are illustrated with photographs taken before and after treatment.

The general conclusion is reached that the results obtained warrant the continuance of this form of treatment. In localized lesions complete regression often follows and in some instances of metastases to the regional lymph nodes gamma beam therapy produces results heretofore achieved only by radical mutilating surgery.

F. LECUTIA, M.D.

Heyman J. Reuterwall O. and Binner S. The Radiumhemmet Experience with Radiotherapy in Cancer of the Corpus of the Uterus. *Acta adol 1941* 2: 1.

This article is in fact a monograph dealing *in extenso* with the various clinical aspects and treatment of carcinoma of the corpus uteri as experienced at the Radiumhemmet of Stockholm. The material referred to includes a total of 402 cases treated between 1914 and 1934 inclusive. The article is divided into four chapters.

The first chapter concerns the classification of uterine cancer. The carcinoma of the corpus uteri includes carcinoma of the fundus and body of the uterus whereas the carcinoma of the collum uteri includes carcinoma of the cervix and of the vaginal portion.

In reviewing all the cases for the present article the authors were surprised by the greater number of cases of uterine cancer which could not be properly divided into the corpus or collum carcinoma subgroup without seriously impairing the diagnosis. They found that often both portions of the uterus or even other pelvic organs were involved concomitantly and therefore they proposed three other subdivisions such as carcinoma of the corpus and collum uteri, carcinoma of the uterus and ovary and carcinoma of the pelvis. It is interesting that in the period from 1914 to 1930 no less than 172 cases were found to be carcinoma of the corpus and collum uteri, 68 cases carcinoma of the uterus and ovary and 11 cases carcinoma of the uterus and several pelvic organs. None of these cases is included in the material of the present article.

The second chapter is about carcinoma of the corpus uteri. In this chapter the authors discuss in detail the following:

The Radiumhemmet classification and method of examination. The classification refers to the grouping of the cases according to the clinical stage and therapeutic procedure. In the method of examination special emphasis is laid on the so called frac-

tional curettage. This is practiced with the view in mind of obtaining a correct classification with regard to the true origin of the carcinoma. First the lower cervix immediately above and around the external os is scraped second after dilatation of the cervix and sounding of the uterine cavity the uterus canal forceps is introduced and several tissue specimens are removed from the fundus third the cervical canal and internal os are curetted with a large curette and fourth the corpus cavity is curetted by means of the uterus canal forceps. The four types of specimens obtained are placed in separate compartments of a specially constructed tissue holder box to avoid mixing.

The Radiumhemmet method of treatment. The first method discussed is intra uterine radium application. Until 1930 a single tube of from 35 to 45 mgm of radium element was introduced into the uterine cavity. This method however was found unsatisfactory and therefore arrangements were gradually made to have several tubes used especially when the uterine cavity was larger than average. The present method which has been employed routinely since September 1930 consists of packing the uterus with a number of 8 mgm radium tubes 20 mm in length 2.8 mm in outer diameter and 1 mm in equivalent lead wall thickness. In very large uteri as many as 20 tubes are packed the distribution conforming to the individual circumstances. On the basis of previous clinical experience the dose is established as 1500 mgm element hours given twice with an interval of three weeks. At each treatment the patient remains in the hospital for four or five days. The technical procedure is described in lengthy detail and richly illustrated especially as it regards the procedure.

TABLE I.—ABSOLUTE AND OVER ALL RELATIVE CURE RATE IN THE TREATMENT OF CORPUS CANCER AT THE RADIUMHEMMET 1914 TO 1934 INCLUSIVE ESTIMATED AFTER A PERIOD OF FIVE AND TEN YEARS RESPECTIVELY DATING FROM THE BEGINNING OF THE TREATMENT. THE TEN YEAR FIGURES ARE PLACED IN BRACKETS

(a) Total number of patients			
examined	416	(83)	
Total number of patients treated	421	(80)	
Number of patients alive without evidence of the disease including those operated upon after failure of radium therapy	190	(60)	
Absolute cure rate	45.7%	(31.9%)	
Relative overall cure rate	47.3%	(33.3%)	
(b) Number of patients alive without evidence of the disease including those operated upon after failure of radium therapy			
	61	(45)	
Absolute cure rate	38.7%	(30.9%)	
Relative overall cure rate	40.0%	(30.0%)	

of sterilization of the containers and the checkup roentgenograms of the pelvis

Vaginal radium application, teloradium, and roentgen treatment are then discussed. These are used only in special cases when the carcinoma has involved the upper vagina and the inguinal glands and when the uterus is fixed. The technique varies considerably.

In estimating the final results, in addition to the three groups already mentioned, the following cases were excluded: patients previously operated upon or treated elsewhere by irradiation, and patients with lacking or inclusive microscopic diagnoses. In this manner, the figures obtained represented values for the radiotherapy alone. They are expressed in Table I.

These over-all results are dissected into various group results according to clinical and technical operability or inoperability, and different methods and periods of treatment.

The choice between operative or radiological treatment is then discussed, but the authors' view in this respect is not clearly defined as yet.

In the third chapter the histological classification is discussed. This chapter was written by Reuterwall on the basis of a revision of the microscopic findings in all of the cases. The histological grouping is given herewith.

In the fourth chapter the physical determination of the dosage and treatment times required in the packing method are discussed. This chapter in turn was written by Benner. It deals with difficult problems of dosage measurement of various radium intensities. Since the number of radium tubes to be used depends on the size of the uterine cavity, it is important to know the intensity distribution in the

PLAN FOR THE HISTOLOGICAL GROUPING USED IN THE
REVISION OF THE RADIUMHEMMET SERIES OF
CARCINOMA OF THE CORPUS UTERI

- Group I —Papillary adenocarcinoma
 - Group II —Very highly organized and differentiated adenocarcinoma of the adenoma malignum type
 - Group III —Highly organized and differentiated adenocarcinoma
 - Group IV —Less highly organized and differentiated adenocarcinoma, up to one-third solid
 - Group V —Adenocarcinoma with squamous epithelial areas
 - Group VI —Adenocarcinoma of slight organization and differentiation, more than one-third solid
 - Group VII —Solid carcinoma without differentiation to squamous epithelium
 - Group VIII—Squamous epithelial carcinoma plus solid carcinoma with portions differentiated to squamous epithelium
 - Group IX —Uncertain cases in which there was well founded reason to suspect cancer
 - Group X —Carcinosarcoma and mixed tumors.
 - Group XI —No microscopical preparations to be had
 - Group XII —No demonstrable cancer in the microscopical sections
 - Group XIII—Cases left unclassified for one reason or another
- Numerous photomicrographs are used for illustration

individual case. To determine this, the author performed a series of experiments with chamois leather bags of different sizes and shapes conforming to situations as found in the radium-packed uterine cavity. The average intensities in Imc , the treatment times, and the total mgm-hours for different numbers and sizes of radium irradiators were tabularly arranged.

T LEUCUTIA, M D

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Stewart C P Nutritional Factors in Dark Adaptation *Edinburgh Med J* 1941 48 217

This article summarizes the literature and presents important data concerning dark adaptation.

The term dark adaptation connotes the acquirement during the time spent in the dark of the power to appreciate consciously low light intensities or dimly lit objects. In individual cases this could be changed by the deprivation or provision of Vitamin A. Indeed the author emphasizes that in many subjects whose tests were good still further improvement followed a daily supplement of 6000 I.U. of Vitamin A for three or four weeks.

These findings establish positively the direct effect of Vitamin A on the dark adaptation of certain subjects at certain times and experimentally that Vitamin A is one of the physiological factors in this process. However the prediction of individual response to Vitamin A was impossible. There was no correlation between the intake of Vitamin A and the rate of dark adaptation nor was it possible to find any level of vitamin intake above which dark adaptation was invariably good or any below which it was invariably bad. This lack of quantitative statistical correlation does not mean that Vitamin A is unimportant in dark adaptation as some authors have concluded. It means that there are other factors involved in dark adaptation in addition to Vitamin A. These factors were found to be age, fatigue, digestive efficiency, minor infections and Vitamin C. Probably still other specific nutritional as well as non specific general biochemical factors are also involved. PAUL STARR M.D.

Anderson E R Karabin J F Udesky H L and Seed L The Oral Administration of Synthetic Vitamin K (2 Methyl 1,4 Naphthoquinone) *Surgery* 194 9 36

The authors determined prothrombin by Smith's bedside method. They found it reduced in jaundiced patients but the reduction did not correlate with the degree or duration of the jaundice. It was also reduced in a number of surgical patients who were not jaundiced but it was not diminished in a number of others that were jaundiced. Oral administration of 2 methyl 1,4 naphthoquinone combined with bile salts elevated the prothrombin to normal in all cases. The response to this oral administration occurs in less than one hour but it does not occur unless bile salts are administered with the vitamin. The rise in prothrombin activity following a single dose was maintained in some cases for only twelve hours in others for three days and in some indefinitely. The maintenance dose recommended is 3 mgm. three times a day.

Patients who have a normal prothrombin time pre-operatively may have a serious drop postoperatively whether jaundiced or not. The reduction was apparent at the third day and was observed to progress in 3 patients not given treatment until the seventh postoperative day.

No nausea or vomiting or toxic effects were observed following large doses of the synthetic compound. PAUL STARR M.D.

Clark W G Vitamin B Complex and Adrenalec-tomy *Endocrinology* 194 28 545

Relatively massive doses of non-toxic thiamin hydrochloride and its pyrophosphate cocarboxylase which were administered parenterally and orally exerted no beneficial effects on the appetite, the average daily weight loss or the survival of adrenalectomized rats maintained on a diet adequate for normal rats nor was there a difference in action between the thiamin and the cocarboxylase.

The same conclusion was reached in the case of orally and parenterally administered riboflavin and parenterally administered sodium phosphate ester of riboflavin in adrenalectomized rats and guinea pigs.

The same conclusion was also made for parenterally administered sodium nicotinate and parenterally or orally administered pyridoxine for dietary supplements of a grass concentrate high in thiamin, riboflavin, nicotinic acid, Factor W and the B₁₂ complex and for a live concentrate high in nicotinic acid, riboflavin, pantothenic acid and filtrate fraction. Parenterally and orally administered pantothenic acid with and without massive doses of riboflavin and parenterally administered Factor W concentrate likewise exerted no effects.

These results warrant the following conclusions:

1. If there is a relationship between the adrenal cortex and thiamin or riboflavin it is not because these substances are phosphorylated and subsequently effective only if the adrenal cortex is present since the phosphorylated forms have no effect after adrenalectomy.

2. Excessive but non-toxic administration of most if not all of the members of the Vitamin B complex has no effect on appetite, weight maintenance, clinical appearance or survival of adrenalectomized rats which are given diets adequate for normal rats.

3. The La Zet and Verzar theory that adrenal insufficiency is a secondary avitaminosis is untenable in the light of these and other results.

PAUL STARR M.D.

Snyderick E V P The Clinical Manifestations of Nicotinic Acid and Riboflavin Deficiency (Pellagra) *American Medical Journal* 1941 14 1499

The author discusses the biochemical mechanisms of oxidation indicating that the three vitamins—

thiamin, nicotinic acid, and riboflavin—are used in the continuous process of cellular nutrition. The symptoms and signs of avitaminosis may be regarded as results of chemical disturbances of cellular function. The fundamental relationship shown in these clinical manifestations is the effort of the body to derive energy from carbohydrates in excess of the available supply of vitamins. Hence, any factor which creates an increased demand for the utilization of energy may precipitate the clinical manifestations of avitaminosis by causing the rapid depletion of coenzymes. Such conditions are unaccustomed work, fever, pregnancy, hyperthyroidism, and the substitution of alcohol or parenteral glucose for food.

The mechanism and treatment of pellagra are discussed, as well as riboflavin deficiency and its therapy. It is emphasized that an adequate balanced diet is most necessary and that it is particularly important to refrain from treating presenting symptoms due to a superimposed single avitaminosis with large amounts of the specific vitamin. This specialized therapy is almost certain to precipitate the manifestations of coincident subclinical deficiencies of other members of the group.

PAUL STARR, M D

Chunn, C F, and Harkins, H N Experimental Studies on Alimentary Azotemia. The Role of Blood Absorption from the Gastro-Intestinal Tract. *Surgery*, 1941, 9 695

A review of the literature by the authors disclosed that an increase in the nitrogenous elements of the blood is regularly observed in gastro-intestinal hemorrhage, when the blood passes down through the intestinal tract. The degree of the azotemia appears to be in direct proportion to the amount of blood in the gastro-intestinal tract and, to some extent, depends on how long the blood has been there. There have been theories propounded that the azotemia is due to the decreased renal blood flow. Others believe that the changes in the electrolyte balance and the element of shock must be considered in the pathogenesis of the urea retentions. Certain authors maintain that the factors of importance are the loss of blood and the increased absorption of blood from the gastro-intestinal tract which causes an increase in body protein.

Chunn and Harkins placed citrated beef blood into the stomachs of a series of dogs by means of a tube. Blood-urea-nitrogen curves were then drawn from the results of repeated examinations of the blood from the jugular vein. The result was a definite rise in the blood-urea-nitrogen in all of the dogs, free from the elements of anemia, hemorrhage, shock, and the factors of starvation, dehydration, or hypochloremia. The authors, therefore, conclude that the azotemia is due to the products of absorption of the blood. They suggest the name of alimentary azotemia for this, correlating the term with elementary glycosuria, in which the mechanism is similar.

WILLIAM C BECK, M D

Calvin, D B Plasma Volume and Plasma Protein Concentration After Severe Hemorrhage. *J Lab & Clin Med*, 1941, 26 1144

Researches have suggested a possible increase in total circulating plasma protein shortly after severe hemorrhage. From work previously reported it is known that in hydremic plethora extra protein may enter the vascular system from some source in the body, possibly the liver. Similar changes have been observed with increased plasma volume, following the use of diuretics in the treatment of edema from circulatory failure and cardiac decompensation. The author presents a review of experiments using large dogs.

Three types of preparation were employed: (a) dogs without food or water for forty-eight hours prior to hemorrhage, (b) dogs which had water but no food twenty-four hours prior to hemorrhage, then were given 500 ml of 0.7 per cent sodium-chloride solution by mouth one hour prior to hemorrhage, and (c) dogs which had water but no food twenty-four hours prior to hemorrhage, with the injection into the jugular vein of enough 0.9 per cent sodium-chloride solution to equal the volume of whole blood withdrawn, immediately after withdrawal.

The hemorrhage from the carotid artery was 25 per cent of the dog's blood volume (as previously determined) within five minutes.

The plasma volumes and plasma protein concentrations were tested according to the newer techniques and the following conclusions were drawn:

1. Following subacute hemorrhage in dogs, there is a compensatory movement of fluid from the tissues to the plasma.

2. The degree of compensation depends, in large measure, on the water balance of the body prior to hemorrhage.

3. Proteins enter the vascular system along with the fluid.

4. The protein entering the vascular system is primarily albumin.

PAUL MERRELL, M D

Neuwelt, F, Levinson, S O, and Necheles, H Studies on Shock. Variability of the Shock Syndrome in Toxic Drug Shock. *Surgery*, 1941, 9 593

Animal experiments were performed in which profound shock was produced by various means. The main criteria employed in determining and evaluating the severity of shock were low blood pressure, acidosis, as expressed by blood carbon dioxide, and hemoconcentration, as expressed by hemoglobin values. The blood pressure reflects the state of vasomotor tone, the blood carbon dioxide the state of tissue oxygenation (and indirectly the adequacy of the peripheral circulation), and the hemoglobin values indicate the plasma-cell ratio and changes in the degree of capillary permeability. In non-anesthetized animals the additional clinical symptoms of prostration, labored respiration, defecation, and urination, were recorded. The authors were impressed by the observation that an animal could present the

typical clinical picture of shock without the presence of all three criteria stated above also that no one of these criteria by itself could be expected to indicate the presence or degree of shock. In a number of experiments it was observed that no appreciable hemoconcentration occurred despite death of the animal from experimental shock whereas in other experiments definite hemoconcentration developed during shock and yet the animal recovered from a state which might be classified as extremely severe when judged by the degree of hemoconcentration.

The authors employed various drugs in order to produce shock: histamine, peptone, croton oil with anesthesia. There was no constancy in the effects of these drugs when used on anesthetized and unanesthetized dogs nor was there any constant correlation between the dose of the drug and the production of shock in the individual animal in 46 experiments.

From these experiments the authors came to the following conclusion:

The production of shock by histamine, croton oil and peptone is extremely variable both in anesthetized and unanesthetized dogs. No correlation seems to exist between the degree of shock and dosage of drug employed in different dogs. Even when profound shock is produced, changes in blood pressure, alkaline reserve and extent of hemoconcentration vary widely from experiment to experiment. Profound or even fatal capillary shock may occur without the development of hemoconcentration at any stage of its course.

SAMUEL H. KLEIN, M.D.

Quill L. M. and Marting E. C. Epiloia. *Surgery* 194 9 58

Epiloia is a clinical syndrome characterized by mental deterioration, epilepsy, adenoma sebaceum of the skin and tuberculous sclerosis of the brain. Other features inconstantly associated are benign tumors of the liver, spleen, kidney, heart, gastroenteric tract, retina, lung, thymus, thyroid, uterus, urinary bladder and nail beds. Epiloia is described by Sherlock as a hereditary familial degeneration and a family psychopathic history is sometimes obtainable.

The onset of the disease is manifest in infancy or early childhood. Idiocy is a common finding. Epileptic seizures begin at an early age but the type is difficult to predict. The facial lesions appear within the first decade. Death occurs at an early age but the mortality is in direct relationship to the extent of the mental deficiency, the development of the brain lesions and the possible presence of visceral neoplasms. The brain lesions are found in the cortex and immediately beneath the ependyma projecting into the lateral ventricles. The tumors are present in multiple areas and the potato-like appearance is unmistakable. Microscopically these tumors are composed of a neuroglial proliferation and large giant cells of glial origin.

Adenoma sebaceum is a nodular eruption of red or brown color distributed over the face. It starts in the nasolabial folds and extends over the cheeks in butterfly pattern. Nail bed tumors are filiform

papillomas or fibromas and are located at the nail cutaneous junction on the fingers and toes. The size may vary from that of the small filiform shag tumor to the golf ball size of tumor. In some instances the nail bed tumors give rise to pain and discomfort especially if secondary infection and hemorrhage occur. Microscopically the tumors are composed of a surface layer of heavily keratinized stratified squamous epithelium. The underlying layer consists of a well differentiated and sometimes hyalinized fibrous connective tissue in which an occasional fibroblast can be seen. Surgical removal is indicated if the tumors are giving rise to pain; they do not recur following adequate surgical removal.

The study discloses that if the patient with epiloia lives through puberty and is capable of mating, transmission of the disease is possible. It was also found in this study of several cases in one family that the disease is not a recessive characteristic but a dominant characteristic.

The direct transmission of the disease from parent to offspring through three generations as presented by this study as well as by that of Kurpiznik proves that the syndrome is truly hereditary, i.e., genotypical.

HOWARD A. MCKENNA, M.D.

Nannini M. C. Late Results of Va. Elinoma (Glasnik) 194 9 58. *Folia R. M.* 947 48 ser. prat. 5 4

Va. elinoma is a tumor produced by the injection of oils which must be considered in deciding claims for damages and exemption from military service.

A case is described in a man who suffered a slight gunshot wound of the right knee in 1915. He was invalided. Two years later he was given a military trial for having kept up an edema of the knee for the purpose of obtaining release from military service. He was ruled against because of lack of sufficient proof. At the end of the war he resumed his work as a shoemaker. In 1926 he applied for a pension on account of the war wound. His application was refused because it was said his disability was not caused by the war wound but by his having injected irritating substances which had affected the knee joint.

Now twenty-three years after the injury he shows a plaque of swelling covering the patella. It is hard and adherent rather loosely to the deep and periarthritic tissues. In the posterior part of it there are a number of hard nodules varying from the size of wheat grain to that of hazelnuts which form cords running horizontally almost around the knee. The skin over the swollen area is bluish. The knee is larger than the opposite knee and the quadriceps smaller than the opposite one from atrophy. In the inguinal region there is a hard anaplastic packet of glands. Flexion of the knee is only 90°. Roentgen examination showed signs of arthritis and small calcified bodies around the joint. The picture was that of a tumor produced by the injection of oils.

The question of how such patients should be treated from the military point of view is discussed. They are not good military material and their

example may affect other men, but it does not seem that they should escape military duty by their self-inflicted injuries
AUDREY G MORGAN, M D

Tesorieri, A A Tumor with Granulosa Cells in a Girl Twelve Years of Age (Tumore a cellule della granulosa in una ragazza dodicenne) *Polichin*, Rome, 1941, 48 sez chir 75

In 1890 Acconci described for the first time a papilliferous cystoma of the ovary in which there were masses of cells arranged in such a way as to resemble the normal follicles of the ovary. Because of the different histological findings many different names have been given to these tumors. The cells have an unmistakable resemblance to the normal cells. In some cases they are small and flat like those of the primordial follicles and in some so large as to resemble those in follicles undergoing luteinization. In these tumors structures have been described that resemble graafian follicles. No ova are found in these folliculoid structures.

The author describes a case in which such a tumor was found in a girl twelve years of age who had not yet menstruated. This was unusual as most of them are found in women past forty. This patient was a twin and comparison with her twin showed that the tumor had evidently had no effect on her sexual or bodily development. The tumor and the ovary and tube on that side were removed and the child was well a year later, at the time of this report. In women it is well to remove the uterus also in cases of these tumors.

There has been some discussion as to whether these tumors are benign or malignant. While they are not extremely malignant, it is not safe to consider them absolutely benign.

In this case giant cells were found in the body of the tumor, at two different times, which confirmed the hypothesis of the connective-tissue origin of these cells.

AUDREY G MORGAN, M D

Erikson, S Nævus Epithelioma Cyndromatosus, with Special Reference to Its Radiological Treatment *Acta radiol*, 1941, 22 217

Under the term epithelial nævus are included several closely related types of tumor, the genesis and mutual relationship of which have given rise to lively discussion during the last few decades. One of these tumor types is nævus epithelioma cyndromatosus, the histology of which was first described in detail by Billroth under the term cyndroma, chosen on account of the characteristic structure with profuse hyaline material cylindrically disposed around epithelial strands. During the latter half of the nineteenth century this type was interpreted as sarcoma or endothelioma. Since then it has been described under a number of different names. In America it is referred to as benign epithelioma of the scalp, nævus epithelioma cyndromatosus, or turban tumor. In the French literature it is called *epithéliome bénin du cuir chevelu*, while in Germany it is usually described as *cyndroma* or *nævus epithelioma cylin-*

dromatosus. As the latter term seems to characterize this tumor well, it is used by the author.

Nævus epithelioma cyndromatosus develops usually during the third and fourth decades but may also first appear in the middle of the second. The chief site of this tumor is the caputellum. Its size varies from the size of a pea to that of a small orange. It is usually semispherical in form and more or less elevated above the surrounding tissue. It is covered by skin of normal color in the case of the smaller lesions and bluish-red in the case of the larger.

The diagnosis of nævus epithelioma cyndromatosus would seem to offer no great difficulty in well developed cases. Confusion with multiple atheroma is scarcely possible. The family history, the large number and site of the tumors, the semispherical form, the tensely elastic consistency, and the bluish color would seem to be sufficient to prevent such confusion. The solitary types of nævus epithelioma cyndromatosus have been as large as brown beans, rather firm in consistency and bluish-red in color. They have not shown any certain typical clinical picture and the exact diagnosis cannot be obtained without a biopsy.

Nævus epithelioma cyndromatosus grows very slowly and aside from the cosmetic disadvantage the tumor causes very little or no discomfort. In the cases in which the tumors are larger and more widely distributed, treatment is indicated. An operative removal may be technically difficult or impossible if the nodules are numerous and close to one another. In such cases radiation with later surgical removal of the remnants seems to be indicated.

The author describes 8 cases of multiple nævus epithelioma cyndromatosus and 6 cases of the solitary type, all of which were treated at the Radiumhemmet in Stockholm. In 3 cases the tissues showed definite transitions between nævus epithelioma cyndromatosus and epithelioma adenoides cysticum. In 1 case the microscopic picture suggested that a nævus epithelioma cyndromatosus may have been transformed into a basal-cell cancer. The familial occurrence of nævus epithelioma cyndromatosus is stressed. One family tree presenting undoubted simple dominant hereditary transmission is submitted. In cases with widespread tumors in which operative treatment is difficult or impossible, good results have been obtained with radiation. The histological picture was completely altered by radiation and a pronounced hyalinization took place.

JOSEPH K NARAY, M D

Blum, H F Sunlight and Cancer of the Skin *J Nat Cancer Inst*, 1940, 1 397

Nearly fifty years ago, Unna described "seaman's skin" as a precancerous condition attributable to continued exposure to light. At present, opinions vary as to the relative importance of sunlight on cutaneous cancer.

Until quite recently, the evidence has been entirely clinical. The following conclusions have been reached by various workers: (1) cancer of the skin

occurs principally on parts exposed to sunlight (2) cancer of the skin is more prevalent in outdoor workers (3) the incidence of cancer of the skin is greater in regions of the earth which receive greatest insolation and (4) cancer of the skin occurs more often in blonds than in brunets. These arguments seem valid enough at first but on critical examination become less convincing. Their weakness lies chiefly in failure properly to evaluate the sunlight factor which may be credited in great part to paucity of information regarding the incidence of sunlight upon and penetration into the skin. Much necessary information is still lacking so that even today any analysis of this phase of the subject must be open to question.

In the past decade strong support has come to the theory of direct causation of cancer by sunlight from experiments on laboratory animals. These studies are important not only because they demonstrate that cancer can be produced by radiation of wave lengths present in sunlight but also because they yield information which permits better evaluation of the evidence obtained from clinical study.

The author examines critically the interrelations of these various lines of evidence in order to provide a better understanding of the prosecution of further studies.

After a thorough discussion of the active wave lengths which cause tumor formation in experimental animals and the incidence of sunlight upon and penetration into the skin the author concludes that concerning evidence from a number of sources indicates that sunlight is an important etiological factor in cutaneous cancer in human beings. However the evidence is tenuous in most instances. The clinical evidence alone is suggestive but that from animal experiments is necessary to lend solidity to the concept. Caution is necessary however in carrying over the evidence from these experiments to the case of man.

The determination of the wave lengths that produce tumors in experimental animals is a very important step in the solution of the problem. Since these are the same wave lengths that principally affect human skin i.e. those shorter than 300 Å it seems probable that they if any play a role in human cutaneous cancer. Numerous tentative hypotheses regarding the mechanism of tumor production by radiation seem untenable because they require the participation of longer wave length.

Much more exact data both clinical and experimental are required to place the concept on a thoroughly sound footing.

JOHN L. KIRKPATRICK, M.D.

Pund E. R. and Stilling F. H. Lymphosarcoma Report of 3 Apparently Cured Cases. *Am J S* 94 5 5

The pathological diagnosis of lymphosarcoma usually implies a fatal outcome. The life expectancy after diagnosis is average two years from 85 to 95 per cent of the patients die before the expiration of five

years and survival for a period of ten years is extremely rare.

The authors report 3 cases with survival periods of six, eight and eleven years respectively. At the present time there is no evidence of the disease in any of the 3 patients. The diagnosis was made histologically and found support in clinical observation and gross study. Spontaneous regression occurred in a lymphosarcoma of the stomach after surgical relief of obstruction. Surgical removal of early lymphosarcoma of a lymph node resulted in a cure of 2 patients. None of the patients received adequate roentgen ray therapy. JOSEPH K. NARAT, M.D.

Allen F. M. Reduced Temperature in Surgery (*Surgery of the Limbs*) *Am J S* 94 5 1 5

The modification of the local tissue metabolism in experimental animals by changes in temperature has been observed to exert a remarkable effect on the survival of tissues with impaired circulation. The clinical applications of this principle may be numerous. The author wishes to advocate investigation of its use in the surgical treatment of diabetic and arteriosclerotic gangrene of the extremities.

Three ways of obtaining refrigeration were tried. The first method was to immerse the patient's limb in ice water to a level about 1 inch above the tourniquet. Subsequently this was modified and the extremity was placed on a layer of ice and covered completely with cracked ice. More recently the limb was surrounded with ice bags. The temperature should be kept slightly above or below 5°C. to provide the desired refrigeration and yet avoid freezing of the tissues.

In the presence of a lowered temperature one may apply a tourniquet to diabetic and arteriosclerotic limbs for a reasonable length of time without producing serious or permanent damage to the blood vessels.

By refrigeration one may obtain complete anesthesia of all tissues of the leg or thigh including the sciatic nerve in a few hours. Instead of providing only anesthesia of the nerves, refrigeration inhibits all protoplasmic activity including the production of shock. In this manner one is permitted to operate in a bloodless field without fear of producing shock.

Immediately before operation the limb is removed from its ice bed to permit the usual preoperative skin preparation. The elapsed time will remain in that state long enough to permit the performance of any ordinary operative procedure. The tourniquet should be elevated just before the wound is closed. This permits a return of arteriality and identification of any unligated blood vessels.

Postoperatively the temperature must be reduced to a level may be necessary to keep the metabolic demand of the tissues for blood from exceeding the vascular supply. The temperature should be elevated as rapidly as possible where no vascular insufficiency exists.

By refrigeration the wound margins can be kept in close approximation for several days without healing.

ing and thus permit drainage without drains if desired. The wound does not decompose or become infected because the low temperature also inhibits the action of enzymes and bacteria. The wound margins can be made to agglutinate when desired by elevating the temperature. Although healing per primam is thus delayed, it is not otherwise interfered with.

A case is reported which illustrates the use of reintegration in the treatment of advanced arterio-sclerosis. LOWMAN W. GIBBS, M.D.

GENERAL BACTERIAL, PROTOZOAN, AND PARASITIC INFECTIONS

Goldberg, S. I., and Bloomenthal, F. D. Staphylococcus Septicemia. *Surgery*, 1941, 9, 505

Staphylococcus septicemia is a condition having a mortality, until very recently, averaging 70 per cent. In this article, the authors report a series of 32 cases with a mortality rate of 1 per cent.

As a rule, the cases with an acute and fulminating onset have a higher mortality rate. Of the various types of therapy employed in this series, the use of staphylococcus antitoxin and sulfapyridine gave the most direct evidence of favorably influencing the course of the disease. In the last 6 consecutive cases, all observed in 1939, the patients recovered. All of them received adequate doses of sulfapyridine and 3 also received staphylococcus antitoxin.

There is clinical and experimental evidence to support the tenet that chemotherapy and serotherapy are synergistic in action and that both should be used in the treatment of staphylococcus septicemia. Early clinical diagnosis and the prompt institution of chemotherapy and serotherapy before corroboration of the diagnosis by blood culture is important. Supportive treatment and sound surgical measures are essential. SAMUEL H. KLEIN, M.D.

Marshall, E. K., Jr., Bratton, A. C., Edwards, L. B., and Walker, L. Sulfanilylguanidine in the Treatment of Acute Bacillary Dysentery in Children. *Bull Johns Hopkins Hosp*, 1941, 65, 94

The authors report observations on a group of children ill with bacillary dysentery who were treated with sulfanilylguanidine. They observed that the drug can be given in a dosage sufficient to insure saturation of the intestinal contents without producing more than a low concentration of the drug in the blood.

No toxic results were obtained in this group of children. However, the drug was not administered longer than fourteen days. Three of 25 adults receiving the drug for various conditions developed toxic reactions as follows: drug fever and unilateral conjunctivitis, a mild hemolytic anemia, and drug fever alone.

The authors recommended the following dosage in treating bacillary dysentery in children: Initial dose per os should be 0.10 gm per kgm, and the mainte-

nance dose 0.05 gm per kgm every four hours until the number of stools per day is four or less. Then 0.10 gm per kgm should be given every eight hours for at least three days. They report that those children who were seen early and treated on or before the third day of the onset responded rapidly and very satisfactorily with a return to normal of the temperature, control of the diarrhea within three days, and a marked improvement in the general condition.

Some of the cases who were treated late in the disease showed the same striking improvement seen in the children treated early, but the majority ran a course uninfluenced by the administration of sulfanilylguanidine.

The writers conclude that the results are sufficiently encouraging to warrant further clinical trial of the drug. RUFUS W. RAWSON, M.D.

Peterson, O. L., Strauss, I., Taylor, F. H. L., and Finland, M. Absorption, Excretion, and Distribution of Sulfadiazine (2-Sulfanilamidopyrimidine). *Am J Med Sci*, 1941, 201, 357

The absorption, excretion, and distribution of standard 5 gm doses of sulfadiazine, the pyrimidine analogue of sulfapyridine and sulfathiazole, is presented in this article. Maximum blood levels were attained immediately after the intravenous injections, in two to three hours after the subcutaneous doses, and from four to six hours after the oral ones. Maximum concentration is occurred soon after the maximum blood level in each instance. Rectal absorption was very poor, only 4 per cent of the administered drug being recovered from the urine and 50 per cent (unaltered) from the first stool thirty-six hours after administration.

On the whole, higher concentrations of sulfadiazine are reached and maintained longer in the blood, with single and repeated doses, as compared with the levels obtained by the use of other common sulfonamides given in similar doses. Small proportions of the total drug concentrations were found in the blood in conjugated form and 20 to 35 per cent of the drug was recovered from the urine in this form, but the acetylation level did not increase during the course of the injections, even with high dosage.

High levels were found in the spinal, pleural, and ascitic fluids, in the first of which two thirds of the blood level was attained. In this respect sulfadiazine resembles sulfapyridine and sulfanilamide.

In the light of preliminary reports the toxic effects of sulfadiazine are notably absent while its efficacy appears to be on a par with sulfapyridine and sulfathiazole in the treatment of most conditions.

STANLEY ROBBINS, M.D.

Bieter, R. N., Baker, A. B., Beaton, J. G., Shaffer, J. M., and Others. Nervous Injury Produced by Sulfanilamide and Some of Its Derivatives in the Chicken. *J Am Med Ass*, 1941, 116, 2231

The order of the drugs in the sulfanilamide series studied according to the amount of injury they pro-

INTERNATIONAL ABSTRACT OF SURGERY

duce in the nervous system of the chicken beginning with the least injurious is *sulfanilamide*, *sulfapyridine*, *di-ne sulfathiazole*, *sulfamethylthiazole*, *sulfamethyldimethyl sulfanilamide* and *sulfamethylthiazole*. Under certain conditions unknown at present and after repeated doses, some cumulation of at least four of these drugs tends to occur in the sciatic nerve. It is to be emphasized that observations on the toxicity of these drugs in tissue produced by the various series studied in the present work are in man.

It is to be emphasized that observations on the effects of these drugs tend to occur in the various tissues of the nervous system produced by the drugs of the sulfanilamide series studied in the chicken are not to be transferred directly to man. It should be emphasized that the effects of these drugs on the nervous system of man are much more sensitive to the toxic effects of these drugs than the nervous system of animals. Further differences in species of animals have been noted. Undoubtedly a similar type of jury though much milder can occur in man. The data in the literature seems to indicate that the frequency of peripheral neuritis in man places these drugs in a more or less systematic order similar to the chicken determined by experiments in the chicken. It is not possible to state that any of the drugs are not effective which have been used clinically. There may be possible unknown factors.

It is not yet possible to state that any of the drugs herein described which have been used clinically show no contraindications as yet unknown for all of them. However the question of the most serious injury is as yet practically answered in the negative. No one knows why these toxic nervous reactions occur whether a hyperpermissivity on the part of the patient is the chief predisposing factor or whether other factors are chiefly important. The tendency of certain of these drugs at least to accumulate in the peripheral spinal cord seems to speculate in the brain and spinal cord. Rather it appears as a direct evidence in favor of the idea of specificity of the drugs for peripheral nervous tissue which can be correlated with the clinical and pathologic changes.

The explanation of the difference in degree of injury done by the drugs appears most logically to lie in their different chemical structures. It appears that these toxic manifestations are chemo. For this reason when any of the drugs of the sulfanilamide group are used physicians should observe that patients must be carefully and institute every precaution to prevent any unneeded rise in the concentration of the drug in the blood stream and any unnecessary prolonged use of the drug. In no instance should any of these drugs be used promiscuously or without careful supervision.

CHARLES BARO M.D.

ENDOCRINE GLANDS

CHARLES BARO M.D.

DUCTLESS GLANDS

DUCTLESS GLANDS

The authors report observations of increased water intake and weight nitrogen storage and increase in blood fat and a very slight glycosuria in

The increase in weight and the nitrogen storage could be imitated by the addition of 100 gm of

The increase in glucose utilization by the animals could be imputed to the standard diets.

Deglycerated insulin was given the same pituitary extract had a hypemetic ketonuria hyperglycemia in creatine glycosuria and some loss of nitrogen. On a low carbohydrate diet the glycogen stores were depleted and the increased glucose utilization was greater than could be accounted for by the increased glucose utilization.

The authors concluded that the hyperglycemia was caused by interference with the formation of glucose from protein. One thyrodoctomized, pancreatectomized animal stored nitrogen when the putative preparation was given in an increased insulin dose. The increased insulin did not prevent the increased glycosuria.

RUFUS W. RANSOY, M.D.

Swingle W W Remington J W Hays H W
and Collings W D The Effectness of
Priming Doses of Desoxycorticosterone Acetate
in Protecting the Adrenal Gland from
Against Water Intoxication *Endocrinology* 1948
28: 531

Experimental water intoxication has often been described. Fatal intoxication in the normal animal is difficult to produce. It takes large amounts of fluid over a long period of time and recovery is the rule. If water is withdrawn when severe symptoms develop in the adrenal cortexed animal, however, it takes a small quantity of water and spontaneous recovery never occurs. The animal can be saved only by the intravenous injection of a large amount of cortical extract or hypertonically primed water. A tenalecortized animal is very responsive to water and cortical extract it responds to very rapidly. In the present experiments the normal animal in the present experiments does not lose the ability of the synthetic steroid desoxy corticosterone acetate to replace cortical extract in its protective action against water intoxication. In these experiments dogs were used 3 cc per kg of cortical extract was given just before the water was administered. The corticosterone acetate was given continuously at a rate of 1 mg per kg per day.

does the volume of the system
the ability of the system to replace cortical
adrenal cortex extract was tested
in a protective action against water used and the
results in these experiments were water used before
priming dose of cortical extract was 3 cm per
kgm body weight intravenously given just before
the experiment the dose of dexamethasone
acetate (DCA) was 1 intramuscular injections of 5
or 10 mgm given at eight hr and two hours
before the experiment Water was given hourly by
stomach sound All rehydrated hydration reached
it was found that in the normal hydration reached
occurred when the intracellular hydration reached
12 percent In the unit of adrenal nly 15 per
cent also less than one third as much urine was
secreted in these dogs as in the normals This shows
that two factors contribute to the susceptibility of
the adrenalectomized animal a kidney factor and a
priming with either cortical extract or dexamethasone
acetic acid restored both deficiencies to nor-
mal and protected against water intoxication Poor

er results were obtained from desoxycorticosterone acetate dissolved in an aqueous medium than when it was dissolved in oil RICHARD WARREN, M D

Kup, J von Concerning the Mechanism of the Anti-Gonadotropic Epiphyseal Factor (Ueber den Angriffspunkt der anti-gonadotropen Epiphysewirkung) *Frankfurt Ztschr f Path*, 1940, 54 396

After pituitary destruction in young animals sexual maturity and the sexual impulse fail, in both young and older animals, follicle ripening, and semen formation fail, while androsterone and folliculin are secreted in only small amounts Young animals endure a removal of the hypophysis better than the older ones The thyroid gland, after hypophyseal destruction, becomes atrophic, whereupon it is noteworthy that in spite of this a colloid inspissation with distention of the follicle of the thyroid results The author points to 1 case which showed that the almost complete destruction of the glandular portion of the hypophysis is not fatal in human beings if it occurs in the adolescent Also, in man, the existence of the sexual impulse is chiefly dependent upon the presence of the glandular portion of the hypophysis, even though the unequivocal presence of the sexual impulse is also closely bound up with the procreation of the sex hormone Disturbances of the normal sexual impulse in the sense of an abnormal pattern can be brought about through changes in the chemical processes of the suprarenal cortex The mechanism of action of the glandular portion of the hypophysis is twofold, a central, situated above the midbrain, and a glandular To be sure, the normal glandular effect is subordinated to the central which originated from the brain The hyperlibido observed after the removal of the genital gland is central, and cerebral in nature and can, by means of administration of epiphyseal extract, be entirely nullified

Engel reported in the last few years on a few investigations by which the anti-gonadotropic effect of the epiphyseal extract could be measured He had also worked out a procedure on which his investigations were founded These test procedures are based on the fact that the glandular hypophyseal factor originating in the ovaries is nullified through the administration of the epiphyseal extract These investigations by Engel appear, therefore, to indicate that the effect of the epiphyseal extract results not from central but from glandular paths Engel's results have already been disproved by several authors Engel has, however, refuted their claims in his new work and strongly defended the validity of his results Serving to exaggerate the confusion, a few authors confirmed precisely each portion of the researches of Engel relating to the mentioned Engel test

On the basis of researches painstakingly presented, it appears completely well founded, according to von Kup, that these epiphyseal factors which have been employed up to the present possess no note-

worthy anti-gonadotropic factor which could be proved on the basis of the Engel test The Engel test procedure is based on an error and the result of the test, often positive, was absolutely invalidated in the case of the 700 gm growing young rabbits Von Kup could show in his investigations with great certainty that presently employed epiphyseal factors possess no glandular anti-gonadotropic effect The great number of results obtained with the epiphyseal factor in human beings with hypersexualism, as well as the personal observations of Kup, undoubtedly indicate that the effect depends not upon a glandular but on cerebral, that is, a central path, and, more precisely, through the central diminution of the sexual urge Accordingly, the original theory of Hofstaetter can now be looked upon as acknowledgedly proved and substantiated

In a few experimental animals, through the epiphyseal factor, the gonadotropic effect could be averted, or better, prevented from appearing, in these cases either illness of the animals or other constitutional states might have been the factor whereby they, as well as numerous controls, might have built up sufficient tolerance against the doses of gonadotropic hormones The interpretation of these cases in the sense of an anti-gonadotropic epiphyseal factor is unconditionally erroneous By means of the epiphyseal factor ("Epiphysean" according to Engel) the gonadotropic factor in rabbits cannot be increased Through earlier researches on tuberculosis patients von Kup has demonstrated that the hypersexual state is not directly dependent on the tuberculous state but evacted through the present endocrine system, in which, in the hypersexual state, the abatement of the actively functioning pineal-body cells of the epiphyseal parenchyma and the decrease in weight of the entire organ could be proved in nearly every case Teratomas and the gliomas lead most frequently, through destruction of the epiphyseal parenchyma, to sexual precocity when the closure of the epiphysis is attained before the twelfth year of life, but in the case of so-called pinealomas no precocity is encountered It is irrefutable that the pathological picture of the precocity can also be evoked at the floor of the third ventricle, since the epiphysis is also bound up with the central nuclei, today this fact is generally accepted in regard to the glandular portion of the pituitary The pineal body also exercises a definite internal secretion effect

(SUNDER PLASSMANN) H HOFFMAN GROSSELOSS, M D

Bischoff, F, Long, M L, Rupp, J J, and Clarke, G J Endocrine Factors Influencing Tumor Development *Endocrinology*, 1941, 28 769

In this paper are recorded the following (a) determination of the minimum dose of exogenous theelin which produces enhanced carcinogenesis, (b) the influence of prolactin given before sexual development, (c) the influence of massive doses of prolactin, (d) the influence of pregnant mare's serum, (e) the influence of the pituitary gonadotropic hormone administered

to produce maximum ovarian stimulation and (1) the influence of the pituitary gonadotropic hormone administered to produce the antagonist effect.

The result of the experiments may be summarized as follows:

The parenteral administration of prolactin, equine gonadotropine or pituitary gonadotropic preparations produce acinar development of the mammary gland in the young (two months old) marsh buffalo mouse comparable to that found at the age of one year. Exogenous theelin even in sublethal doses fails to produce this effect.

Sublethal doses of theelin (3.8 mgm per mouse in five months) are required to enhance carcinogenesis in the marsh buffalo virgin female mouse. The increase obtained for both the adenocarcinoma of the breast and for lymphosarcoma was only doubtfully significant.

Prolactin failed to influence the onset of the adenocarcinoma of the breast or lymphosarcoma in virgin females when first administered before sexual maturity (720 units per mouse in twelve months) when given at the age of from sixty to ninety days (660 units per mouse in nine months) or when given in massive doses (2700 units per mouse in nine months).

Pregnant mare serum (750 units per mouse in eleven months) and purified pregnant mare serum hormone (950 units per mouse in fourteen months) significantly retarded the onset and decreased the incidence of adenocarcinoma in the virgin female mouse.

Mice which had received the intermittent doses of prolactin, mare serum preparations and pituitary

gonadotropic preparations were able to become pregnant after one year of treatment.

Marsh buffalo mice are susceptible to cancer and resistant to theelin when compared with other cancer susceptible strains of mice.

The following theory is offered to explain the facts observed in the foregoing experiments:

In the marsh buffalo strain the breasts of virgins remain undeveloped (scattered ducts and buds) during early adult life but the repeated stimulation by the ovarian secretions finally produces a certain degree of acinar development. Up to this point there is no carcinogenesis. Further stimulation however carries the anatomical development to a point where the mutation leading to carcinogenesis (a hereditary factor) occurs. This further stimulation occurs because of the failure of the marsh buffalo mouse to produce in later life proper defense mechanism against the repeated stimulation occurring with the recurring ovarian cycles or because the character of the ovarian secretion changes. If the further stimulation were not due to failure of a defense mechanism or a change in the secretion at middle age then carcinogenesis should occur earlier in the prolactin treated mouse which has acinar development six months or more before its normal control and still does not develop carcinoma faster than its control. Mare serum hormone and pituitary hormone-stimulation prolong the defense mechanism possibly by the production of antihormones or by maintaining the early ovarian secretion. Massive doses of the lin (sublethal) are required to break down this defense mechanism which functions during early middle life.

JOSEPH A. NARAT, M.D.

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PRINCIPLES OF SURGICAL PRACTICE

SURGICAL BACTERIOLOGY

FRANK L. MELENEY, M D, F A C S, New York, New York, Presiding

Collaborators EDMUND ANDREWS, M D, F A C S, Los Angeles, California, J. DERYL HART, M D, F A C S, Durham, North Carolina, WILLIAM A. ALTEMEIER, M D, F A C S, Cincinnati, Ohio

INTRODUCTION BY DR. MELENEY

IS any one surprised that surgery and bacteriology are linked together? Just remember that six decades ago there was no science of bacteriology, and surgery was plagued with inevitable infection which followed operative procedure. Pasteur had just demonstrated against strong opposition that bacterial growth caused fermentation and putrefaction. Lister applied this knowledge to surgery and again against strong opposition he brought postoperative infection under control. Surgery became Bacteriological Surgery and increased abounding in its scope. The science of bacteriology gradually built up certain rules for aseptic technique. Surgery adopted these rules and then went merrily on its own way—and forgot all about bacteriology—like a husband who gains distinction because of the wisdom and labor of his wife and then divorces her because he thinks he has outgrown her and believes he can stand on his own feet without her help. Why has Surgery forgotten Bacteriology? I believe that it is because the training of a surgeon requires long hours of technical experience not needed by the medical man. The surgeon's day in the hospital often begins an hour earlier and ends an hour later than that of his medical confreres. Furthermore, the surgeon must devote long hours to the detailed study and frequent review of anatomy. But the time has passed when

the surgeon is content to perform the mechanics of surgery and let others solve the scientific problems connected with his art. Twenty odd years ago, after my returning from France, when I went to my chief, Dr. Allen O. Whipple, for advice regarding my further training in surgery, he said, "In the past, the surgeon has had to be an anatomist, now he tries to be a pathologist, in the future he will have to be a physiologist, a chemist or a bacteriologist. Which do you want to be?" I chose bacteriology and ever since then my chief interest has been in surgical infections.

Now there are large groups of surgeons working on chemical problems, for example, blood chemistry, water and electrolyte balance, blood coagulation, and vitamin deficiencies. There are also many young surgeons working in the field of physiology—blood flow, respiration, gastro-intestinal motility, peripheral circulation. But the field of bacteriology has not been widely explored by surgeons, although the problems in it are legion.

Modern surgery must not only acknowledge its debt to bacteriology but must look to it for the solution of many of its problems. About a third of the cases in the surgical wards of a general hospital are primarily problems of infection. Furthermore, all of the other cases are potentially or have actually become problems of infection by the very fact that they undergo an operation. And these problems must be solved by surgeons who have been trained in the fundamental principles of bacteriology rather than by bacteriologists who do not have a surgical point of view.

Panel Discussion, Clinical Congress of the American College of Surgeons, Chicago, Illinois, October 23, 1940

THE IMPORTANCE OF ADEQUATE TRAINING FOR THE SURGICAL BACTERIOLOGIST

EDMUND ANDREWS M.D. F.A.C.S. Los Angeles California

IT is almost axiomatic that the value of a bacteriologist's report is in direct proportion to his training and experience. If this truth were more generally recognized we would not have surgical bacteriology so often relegated to a poorly trained technician or to an interne who has not seen a bacterium since his course in bacteriology in his first or second year in medical school. That this is so is only too obvious in many reports of surgical infections appearing in our surgical journals. We often see that cultures of such cases yielded streptococci without specification whether they were hemolytic or non hemolytic aerobic or anaerobic or staphylococci without further specifications or a gram positive organism morphologically like the gas bacillus without any real proof of the presence of the clostridium welchii.

Every surgical department needs not only a thoroughly trained bacteriologist who can give an exact and complete analysis of every culture from any surgical infection but preferably one who has had surgical training and can evaluate clinical findings and correlate them with bacterial findings.

This is true particularly in emergency cases in which a quick report is required in order to determine the method of treatment. Often a stained smear will give valuable information within a few minutes. The examination to be of value however must be made by an expert who can appreciate the significance of what he sees in the light of his experience both with the particular clinical type of infection under consideration and the specimen therefore. This may be particularly difficult when the specimen shows not one but a great mixture of organisms—the significant organism being masked by the presence of fellow travellers. Here relative numbers of the different morphological types may be of some importance.

Such preliminary reports must of course always be checked by the findings after bacterial cultivation. To an expert eye the presence of certain organisms in the smear or certain features of the clinical picture may indicate the need for special methods of culture or special media in order to find out all of the organisms which are

present. The expert will of course have available and will use routinely anaerobic as well as aerobic methods in order to determine the presence of anaerobes as soon as possible.

One field of bacteriological examination which particularly requires an expert's opinion is in sterile regions in which changes in the number or kind of bacterial flora may take place and thus indicate a pathological process. These regions include the upper respiratory tract, all of the alimentary canal and the vagina.

It is important that the surgical interns or residents should be given a period of training under such an expert in order that they may more fully understand the pathogenesis and natural course of the surgical infections. It is also advisable for one individual to see a case through from beginning to end so as to note the bacteriological changes which indicate the response or the resistance of the infection to the treatment given. Quantitative as well as qualitative studies are often of considerable importance and these can be made by the direct cultivation of the exudate or blood agar plates aerobically and anaerobically.

Surgical bacteriology is almost a generation behind other fields of bacteriology and other fields of surgery. It should be a strong link binding the two together. There are many problems still to be solved and this can best be done by or under the direction of one who has had a thorough training both in surgery and in bacteriology.

The cost of such a service may seem high but whenever an adequate surgical bacteriology service is established it soon demonstrates its value to the surgical department. A continuous study of the problem of the infection of clean operative wounds keeps the surgical staff keen to avoid bacterial contamination of wounds. The early recognition of the etiological agent will determine early treatment and thus many times may save a life or curtail the period of stay in the hospital. Under expert guidance certain of the many problems of surgical infection still unsolved may reach a final solution by methods of research entirely outside of the capacity of laboratory technicians. It is hoped that the surgeons in this College who do not have available such a service will demand adequate and upon their return to their stations

THE CONTINUOUS CONTROL OF OPERATING ROOM TECHNIQUE

J DERYL HART, M D , F A C S , Durham, North Carolina

DO we need continuous bacteriological control of our operating-room technique? We might as well ask if a modern army needs an intelligence division, scouts, and secret operatives to keep it informed as to the activities of the enemy. Bacteriology is the intelligence division of the Surgical Department, and no surgical department is justified in taking human lives into its hands without having the most accurate information as to the bacterial activity and distribution in the vicinity of the wound, including all people and materials that come in proximity to and in contact with the patient. Every surgeon should analyze critically each step in his operating technique and the preparation of the necessary supplies. This cannot be delegated to someone not familiar with surgery and its problems, as can best be illustrated by two episodes from my own experience.

In 1925, as the result of a series of infections on the Surgical Service where I was working, a bacteriologist was brought in to find the weakness in our technique. He observed for days, carefully inspecting every procedure. In the end he stated that we had an "air tight technique" but he had totally ignored the possibility of carriers in the personnel, the effectiveness of the masks used, and the possibility of the air itself serving as a medium for the transportation of bacteria to the wound and sterile supplies.

The second episode occurred shortly after the opening of the Duke Hospital. While we were hypersensitive to any untoward results in the new institution, we had occasional unexplained infections which could not be avoided. More or less blindly, without bacteriological studies, we tightened up on our technique at every possible point as we then understood the problem, but without satisfactory results. Then the surgeons themselves undertook bacteriological checks on every phase of our technique and were greatly surprised to learn that we could obtain our chief offender, the hemolytic staphylococcus aureus, from the air by sedimentation more frequently and in greater numbers than from all other sources combined (exclusive of the noses and throats of

the occupants from which they were ejected into the air). We then plotted a curve showing the daily sedimentation rate of these organisms, hoping to be able to anticipate the periods of danger for large operative procedures. The peaks of air contamination corresponded to the epidemics of respiratory infections. After attempting in various ways to control the contamination of the air, but with only moderate success, we finally resorted to sterilization of the air with bactericidal radiation. With the elimination of this hitherto largely ignored source of contamination of wounds and supplies our unexplained infections in clean wounds have all but disappeared. This study would not have been carried through by any one other than the surgeons who went through the agony of every severe infection that occurred. [As a matter of fact, criticisms were expressed because of the quantities of culture media which were being used in the attempt to solve this problem.]

In order to obtain the best results every surgical department must be in a position to answer by actual bacteriological studies any problem or question which may arise in regard to technique. The older members of the staff may or may not have accurate information in regard to the effectiveness of various measures employed, but the regular check with cultures which should be inspected by each member of the staff will go far to impress on the younger men the true value of their so-called aseptic technique.

Autoclaves, sterilizers, and hot and cold water tanks should be subjected to bacteriological culture tests at regular intervals. These may be carried out at the request of the Surgical Supervisor, but every surgeon should be familiar with their results.

The effectiveness of the skin preparation should be controlled by periodic cultures for every method of clean-up and every type of antiseptic. A report may be filed by the bacteriologist or the surgeon assigned to this task but these cultures should be inspected by each member of the staff. A permanent record, of course, must be kept for purposes of comparing one technique with another.

It is not enough to know the effectiveness of skin antiseptics in giving a temporary absence of

comes prolonged the increa be ng pr portione to the size of the dose

Heparin can be used in blood transfusion either by adding it to the blood as it is collected or by injecting it into the donor 1 mgm of heparin per kilogram of body weight and the blood is with drawn from one to five minutes later At the end of one and one half to two hours the coagulation of the donor's blood returns to normal In general surgical practice it is in operations on the vascular system that heparin is of the greatest use It is the most active of all anticoagulants It is non toxic and its use in no way interferes with the analysis of the blood

How can heparin affect a venous thrombo is? The coagulation of the blood is retarded the blood becomes more fluid new fibrin is prevented from forming on the thrombus and loose blood corpuscles are washed away so that the thrombus does not become complete The heparin permeates into the capillaries and may contribute to the more rapid absorption of the extravasated hemorrhages

Heparin can also be used for extensive hemorrhages into the retina or the vitreous It is not necessary to keep the patient in bed all of the time Ambulatory patients can have two injections daily each from 100 to 125 mgm which makes a total dose of about 250 mgm although Ploman frequently gave injections at four hour intervals up to 400 mgm daily

LESLIE L. MCCOY M D

Doherty W B Orbital Implants with Special Reference to Vitallium *Arch Ophth* 94 25 637

The tolerance of the orbital tissue to foreign materials has always been well known and for this reason many substances have been implanted in Tenon's capsule Most ophthalmologists of the present day concede that something should be put into the socket after enucleation in order to obliterate the unnatural folds and depressions in the upper and lower lids and to prevent protrusion of the eyeball and sinking of the artificial eye For this reason aluminum celluloid sponge wool silver rubber silk catgut peat agar agar paraffin asphaltos cork vary in success At present the most common implants are gold balls glass balls fat and fascia lata Each of these has its champion and the author feels certain that there is no orbital thalmo list who has not seen the unpleasant recurrence of an implant being expelled from the orbit in no apparent reason The operation seemed perfect and there are no complications ne ertheless the implantation was a failure

The author calls attention to an alloy called vitallium and the medical uses to which it has been applied as well as the clinical and scientific experiments that have been performed with it Vitallium is a casting alloy 90 per cent of which is composed of cobalt and chromium with a small percentage of molybdenum It is excellent

strong hard and very light It has a specific gravity of 8.29 which is much less than the specific gravity of pure gold (19.3) or of casting golds which range from 14 to 18 Vitallium resists strong mercuric acid and a solution of sodium chloride of any degree of concentration produces no effect on it over any period of time Vitallium is stronger and cheaper than gold it can be boiled and it is inert in the body tissues Any implant in the orbit certainly should be sterilized by boiling Vitallium produces no tissue reaction and it is not influenced by heat or by cold as are other synthetic and plastic materials The author has used vitallium orbital implants for more than a year In 6 cases there have been no complications and the cosmetic results have been excellent

LESLIE L. MCCOY M D

MOUTH

Brown J B and McDowell F Secondary Repair of Cleft Lips and Their Nasal Deformities *Ann Surg* 194 14

In spite of care in performing the primary barelip repair to secure a good alar level and direct on a good straight columella a full lip border a full vermillion and a flex on crease across the lip secondary correction of the lip and nose may be required Both of these usually need correction and must be considered together in planning the repair If possible the already present is readjusted but in extreme deformities tissue from elsewhere may have to be utilized Several carefully planned procedures may be necessary with initial emphasis on the gross restorations

Some of the essentials in carrying out the procedures can be best anesthetized can be obtained by either a local block or infiltration or by the intratracheal administration of ether The incisions should be carried along those already present to open as few new areas as possible In the readjustment the vermillion border and the floor of the nose are good places to match the tissues and can be marked with 3 per cent methylene blue The intra nasal incision are closed with chrom catgut and the skin and vermillion with fine No. 000 silk suture placed close to the incision Forceps are not used in the skin

The construction of a philtrum and cupid's bow hardly by any means and necessary sacrifice of normal additional scars and necessitate sacrifice of normal tissue Occasionally the Mirault flap may be too large and this can sometimes be corrected by the limited procedure of reducing the size of the flap without opening the lip completely The lip which is retracted can be held forward with a dental prosthesis which can often be built over and held on the existing misplaced teeth It may be necessary to transfer the skin grafts in the upper buccal rim to the lip from the bone

In the repair of double barelip the use of the prolabium in the full length of the lip almost always



Fig 1 Columella construction by advancement of flap from upper lip *a*, Design of continuous flap, with base at tip of nose, lateral triangles to fill opening in septum and to allow for shortening of lip *b*, Flap dissected free *c*, Tip and dorsum of nose loosened and freed from septum by incision up over top of septum *d*, Flap being sutured in place, with full extent going along base of septum and

small triangles from floor of nose going in along both sides just above septum *e*, Flap in desired position at a right angle to lip, and not pulled back down in it *f*, Lip closed by shifting it clear over to midline without putting sutures in new columella that will drag it back down in lip *g, h*, Profile before and after advancement of lip flap for columella (Courtesy of J B Lippincott Co)

results in an ugly notch. When this situation is found or when too much lip has been sacrificed, a flap from the lower lip may be necessary. This procedure leaves a scar in the lower lip and an inert mass in the upper but is often the only way of correcting the disproportion in the two lips. The tendency toward forward protrusion of the jaw may be corrected either by partial resection of the jaw or by reduction in the size of the chin. Orthodontic methods are helpful in correcting the shape of the upper dental arch and the position of the teeth.

The repair of the nasal deformity is difficult because of certain molds, skin folds, borders, and delicate shadings of the normal nose, lip, and mouth. It is best to try to correct these deformities by the regular intranasal osteoplastic procedure of reducing the size of the nose and reconstructing the lower lateral cartilages. Only when the nose has been "slumped" badly for a long time will it be necessary to remove excess skin through external incisions.

The bony nose is corrected by removal of the dorsal hump, narrowing of the side walls with pos-

sible removal of a triangle of bone and straightening of the septum (as actually the Joseph operation). The reconstruction of the lower lateral cartilages is carried out on both sides but with greater attention to the cartilage of the deformed side. The dome of the cartilage may be turned up to make a prominent medial crus or the lateral crus may be anchored to the opposite cartilage over its own medial crus. The direction of insertion of the ala into the face can be improved only with external incision. An open floor of the nostril can often be corrected by local mobilization of tissue but may require shifting of tissue from the cheek at the junction with the ala. Should the airway be blocked the septum can be resected or straightened at the same time or as a separate step. Completely blocked nostrils are usually very difficult to restore and require free skin grafts after very careful opening dissection.

The secondary corrections in double clefts present a difficult problem. The columella is constructed by advancing part of the probolium from the lip into a position below the septum (Fig. 1). The lip may have to be held forward with a costal cartilage implantation. If the columella is absent an arm or wrist flap may be necessary to replace it. Occasionally the probolium is jammed backward and will obstruct the airway. This will necessitate excision of the obstructing mass and the possible grafting of raw surfaces in the nose.

The patients must be advised to control facial grimaces, loud speech and other attitudes that call attention to the imperfections of their faces. They must secure jobs that do not require conspicuous appearance in the public eye. It is true that they are more apt to have children with similar defects but this is not universally true.

The authors illustrate many of the procedures.
BRADFORD CANNON, M.D.

Beck H. Fractures of the Temporomandibular Joint (Ueber das Frakturgeschehen d. d. Kiefergelenkbrüche). *Zisch'sche Monatsschrift* 1940 38:2

Fractures involving the temporomandibular joint occur most often from indirect violence and in association with other fractures of the mandible. The characteristics of the individual fracture are dependent on the kind, force, location and direction of the violence. For the occurrence of a fracture, dislocation, the position of the mouth whether opened or closed is of significance. The author differentiates with Wassmund the perpendicular (longitudinal), the transverse and the oblique fracture of the mandibular neck. The latter are the most common form of fracture and occur as a result of violence from the front against the chin and in the direction of one or both mandibular joints. Finally, shattering or shatter fractures sustained through gunshot wounds are mentioned.

In contrast to other bones in the oblique mandibular fractures the author most frequently observed dislocation of the small fracture fragment to the outside. At the moment of fracture because

of the anatomical form of the joint body it is rotated laterally and it remains in this position. The individual form and length of the joint body, the breadth of the muscular insertion, the age of the patient and the presence of teeth in the jaw play as great a role as the cushioning, yielding and elasticity of the condyle. Subluxations are the most frequent in fracture dislocations of the condyle. For the occurrence severe and usually direct violence against the joint is necessary.

In agreement with Wassmund five types of dislocation are differentiated. These are illustrated in the original article with roentgenograms. Joint fractures in children are rare, whereas fractures of the horizontal ramus and of the alveolar process are common. The explanation of this fact lies in the physiological elasticity of the bones in childhood.
(VON BRANDIS) JOHN L. LINDQUIST, M.D.

Jacobs M. H. Malignancies of the Oral Cavity.
Am. J. Orthodont & Oral Surg. 1941 27: 253

Malignancies of the oral cavity may be divided into those which occur in the lip, tongue, floor of the mouth, cheeks, alveary glands and jaws. Epidermoid carcinoma constitutes 93 per cent of the malignancies found in the oral cavity. The remaining 2 per cent consist of adenocarcinoma, carcinoma adenoides cysticum and basal-cell carcinoma. Mixed cell tumors and adamantinomas must also be considered potential malignancies, the former because following excision they may become malignant, the latter because of their tendency to marked local destructive processes and infiltration into the surrounding soft tissues and lymph nodes.

The treatment of precancerous lesions is an important factor if malignancy of the oral cavity is to be prevented. Papillary and fissural leucoplakia of the mucous membranes of the mouth should be surgically or electrosurgically removed. This is more urgently indicated when there is a history of malignancy in the immediate family of the patient because more and more evidence of a hereditary diathesis or predisposition to malignancy is being accumulated in the literature. That tobacco smoking in any form or tobacco chewing is influential in forming leucoplakia as well as definite malignancy can no longer be questioned. The number of cases presenting malignant lesions in the mouth because of long continued irritation due to carious teeth and ill fitting crowns and bridgework is not coincidental.

Epidermoid carcinoma of the tongue in its early stages is generally restricted to one side, while the base is not involved. When the base is involved it spreads to all parts of the tongue and surgery is of no avail. If the tip is involved it also spreads to all parts of the tongue, which indicates the importance of early treatment. Involvement of the border of the tongue results in spreading to the floor of the mouth. Metastasis to the lymph nodes in epidermoid carcinoma varies. In some cases involvement takes place early, while in many advanced cases there is no involvement.

Adenocarcinoma occurs most commonly in the salivary glands and in the cheeks. At first the tumor is encapsulated, but very quickly it breaks through the capsule. The local lesion may be quite small but metastasis to the lungs or other organs can often be demonstrated. Mixed-cell tumors occur in the salivary glands, palate, and buccal mucosa. Most of these tumors are encapsulated, but many are fused with the structures of the salivary glands. The encapsulated forms of the tumor are usually extra-glandular.

Small mixed-cell tumors may remain quiescent for a number of years before they show active and invasive growth. Many of these tumors contain offshoots from the mass itself, in the form of small nodules. This may account for recurrences even when it was believed that the entire tumor had been extirpated. Mixed-cell tumors are potential malignancies and must be treated as such. If there is any uncertainty of total extirpation, radium or x-ray treatment should be used.

Adamantinomas are solid or cystic growths occurring in the jaws with local malignant tendencies. They form a cavity within the alveolar borders, and gradually expand them. When the capsule ruptures, the tumor invades the surrounding tissues. An adamantinoma may break through the floor of the antrum and invade it to such an extent that exophthalmos may be produced. Recurrent adamantinomas sometimes develop into adenocarcinomas and epidermoid carcinomas. The greater the number of recurrences, the more chance that cancer may occur.

There are three accepted methods of treatment for oral malignancies: irradiation with x-ray or radium, irradiation followed by surgery, and surgery followed by irradiation. The method of choice depends upon the size and location of the tumor. Early malignancy can best be cured by surgery followed by x-irradiation. Advanced carcinoma of the base of the tongue is best treated by x-ray treatment or radium implantation. When deforming operative procedures seem necessary, x-irradiation has proved more successful.

True adamantinomas respond to surgery followed by careful and thorough cauterization. When biopsy reveals the adamantinoma to be undergoing transitional changes into carcinoma, surgery must be followed by x-irradiation. X-irradiation alone for adamantinoma has not proved successful in the author's cases.

When surgery is resorted to in the treatment of oral malignancies with palpable cervical glands, block dissection of the cervical lymph nodes must be performed. Whether extirpation of the lesion and neck dissection should be done in one operation depends upon the age and condition of the patient. It should be left to the judgment of the operator. There is a greater tendency at this time to perform the block dissection of the glands some time following the removal of the local lesion.

JOSEPH K. NARAT, M.D.

Thoma, K. H. Rhabdomyoma of the Tongue.
Am. J. Orthodont & Oral Surg., 1941, 27, 235.

Rhabdomyomas occur in the oral cavity, and, like leiomyomas, are rare. They occur at any age and may be congenital. In acquired tumors, there is generally the incidence of trauma to be considered. Patients remember having bitten the tongue and connect the injury with the onset of the tumor. Such information, of course, is not always very reliable.

The tumors generally form a hard, circumscribed, slightly elevated nodule somewhat lighter in color than the surrounding mucosa. In rare instances they extend from the surface and are pedunculated, their size varies between that of a pea and that of a pigeon's egg. They grow very slowly and are generally benign in character, although several reports state that they recurred after excision. This is not surprising when one considers that they are not encapsulated. In isolated cases the tumor formed metastases.

Excision is indicated either by means of the scalpel or endothermy knife. If the tumor is benign and excision is complete, there should be no recurrence. Because of the cases in which an epithelioma developed from the surface epithelium, it is important to recognize such a condition promptly, and either perform a more radical excision or follow up with x-ray irradiation.

A new case of a rhabdomyoma of the tongue is reported by the author. The tumor was made up of the granular type of cells which some investigators have believed to be degenerated muscle fibers, but which Diss identified as atypical myoblasts. The patient was a woman thirty years old.

JOSEPH K. NARAT, M.D.

NECK

Kartavlin, V. A. Malignant Tumors of the Thyroid Gland. *Sov. khir. arkh.*, 1940, 47, 137.

Of 11 patients with malignant tumors of the thyroid gland observed by the author, 5 were men and 6 women. In 3 cases an adenoma with metastases was found, in 2, a malignant papilloma, in 5, carcinoma, and in 1, sarcoma. In 6 cases a definite diagnosis was made before the operation, while in 3 other cases malignancy was strongly suspected. Six patients were less than forty years of age. The tumor was removed in 7 patients. The operation was followed by deep x-ray therapy. Of the 7 patients who were operated upon, 3 were still alive after three years.

The author maintains that malignant tumors of the thyroid gland develop most frequently in a pre-existing goiter.

JOSEPH K. NARAT, M.D.

Chaikoff, I. L., Entenman, C., Changus, G. W., and Reichert, F. L. The Influence of Thyroidectomy on Blood Lipids of the Dog. *Endocrinology*, 1941, 28, 797.

In these experiments, blood-lipid determinations were made after excision of thyroid tissue in the dog.

An inverse relation between thyroid activity and blood lipids has been repeatedly observed but the mechanism of this relation is unknown.

The levels of blood cholesterol both free and esterified phospholipids and total fatty acids were compared in 10 dogs before and after thyroidectomy. These determinations were made frequently for as long as two hundred and fourteen days after excision of the gland. All dogs but 1 were maintained on a constant caloric intake.

It was found that although blood lipid levels rose after thyroidectomy the various lipid constituents responded differently the most pronounced increases occurring in cholesterol and in total fatty acids.

The earliest and most striking changes occurred in cholesterol esters in which 4 cases exhibited a 300 per cent increase over the highest pre-operative

values. Significant changes were observed as early as seven days after excision of the thyroid glands.

In 7 of the 10 dogs increases in the total fatty acid content occurred after thyroidectomy but the extent of the rise averaged only about 75 per cent over the pre-operative values. This rise occurred as early as one week postoperatively with definite changes present in all 7 dogs at the end of one month.

Marked changes in the level of free cholesterol or of phospholipids were observed infrequently after thyroidectomy.

The blood lipid response to thyroidectomy appeared to be irregular and variable which indicated an unstable blood lipid level as a characteristic feature of the thyroidectomized dog. There was no uniformity regarding extent of response time of maintenance of elevated levels or degree of fluctuation.

S I LOVY TRITELMAN M D

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS, CRANIAL NERVES

Guleke, N. Should the Fresh Bullet Wound of the Brain Be Sutured? (Soll die frische Hirnschusswunde genaht werden?) *Deutsche mil. Arzt*, 1941, 6 1

This is an old question. Langenbuch was in favor of the primary suture of bullet wounds of the brain, von Bergmann was against this procedure. However, Bergmann recommended it for those cases of complicated skull fracture associated with wounding of the brain. Also, he, even in his time, advised the eventual shifting of skin flaps. During the World War Barany, Frey, Kaerger, and others favored primary suture. Even at the present time doubt still exists as to whether it is possible to remove primary infection from brain wounds to the extent that complete wound closure can be ventured, and one is still not completely clear as to the extent to which the operative care of the wound may be delayed without endangering of the healing process. The time period of six to eight hours, which is generally accepted as the time during which it is permissible to carry out primary suture after proper operative treatment of the wound, can frequently not be adhered to under conditions of war.

Thanks to the wise recommendations of the army physician, Kittel, a specially advanced station, outfitted with the necessary instruments, was assigned to Guleke during the advance through the Maginot line, 15 km behind the front, so that the wounded could be delivered to this station within five or six hours after injury, later on after the army had broken through the Maginot line, the distance of the station behind the front was increased from 80 to 100 km. However, the transports were so rapid that even then the majority of the wounded, about two-thirds, were brought to the station within twenty-four hours. If they did come later, it was for the most part due to the fact that they had been found in the field that much later. In one-third of the cases, the care of the wound took place within forty-eight hours. Even longer transportations were fairly well withstood as long as the patients had not been previously operated upon. This station, for the care of bullet wounds of the brain, remained at its original place as long as it was necessary to enable the very last of the inmates to be brought back to the homeland without any danger, this was about three months.

Guleke by no means operated indiscriminately. Twenty-two of the wounded had to be excluded from the very first because of the severity of their wounds. However, when he saw that he was able to heal some apparently hopeless cases by means of operation, he widened his operative indications and operated on 23 of such cases, but without success. The

post-mortem findings revealed the reason for this, the destructive processes were too great. The character of the outer wound is not the deciding factor. Soiling of a greater or lesser herniation of the brain is *per se* no contraindication. In 2 cases he successfully performed an electrical débridement of the wound of the soft parts and brain during the first twenty-four hours after injury in the presence of a brain herniation that was already foul-smelling and necrotic. He operated upon almost all of the cases within the first forty-eight hours. However, he employed primary suture, in some exceptional cases, even three and four days after injury without experiencing any serious disturbances.

The suction technique with the water pump permits a much better cleansing of the bullet tract in the brain than all previous techniques. To be sure, in many instances a bone fragment may present itself, and only after the removal of the latter will the destroyed brain substance run out of the wound. In this respect it is interesting that Guleke, in these cases, in contradistinction to Schoenbauer and other neurosurgeons, does not think it necessary to do away with the careful digital palpation of the wound if it is not possible to do so by other means, in order to remove bone fragments and foreign bodies from the wound. He was able to remove grenade splinters from fresh wounds with the electromagnet, whereas this procedure was unsuccessful in older wounds because even very delicate scars can offer a marked resistance to this instrument. The surface of the brain comes to lie at its normal level after suction has been applied, and the bullet tract lies open and gaping after all of the brain fragments have been removed. If this is not the case then it is necessary to apply further suction. Sometimes the brain surface will sink to its normal level, only when the bulging and, for the most part, markedly hyperemic edges of the wound have been widely debrided.

Sinus hemorrhages are frequent complications. The author saw these occur 10 times in 114 operative cases of gunshot wounds of the skull. He controlled these hemorrhages by means of a lateral suture because tamponade does not come into question in primary wound closure, and he did not think that hemostasis by means of muscle tabs seemed advisable because of the danger of infection. Injuries of the middle meningeal artery must sometimes be treated by means of a cigarette drain with a specially placed small opening in those cases in which the wound cannot be oversewn. Even injuries of the cerebral ventricles may heal in exceptional cases, but it is particularly in these cases that one must carry out a primary wound closure because tamponade would lead to secondary infection. The author always permits the dura mater to remain open.

Most careful hemostasis is necessary. This is followed by a three-layered suture of the soft parts

should not use this statistical study for the purpose of deciding the question here proposed. This study can furnish only a comparison of the results obtained by the open treatment of these wounds and by primary suture as employed in a group of completely or almost completely similar cases in which the operative treatment aside from this particular point was practically the same. However a statistical study of this kind in which open wound treatment was employed is not available because the neurosurgeons of today are almost all in favor of primary wound closure. It should be stated however that 80 per cent of cures represents a remarkably good result. Naturally one will be able to pass judgment on the end results only after years have passed. In the meantime the hope may be expressed that the smoother the course of healing the fewer will be the delayed disturbances that may develop. On the whole the impressions obtained in all of the operative cases was an excellent one. Headaches and complications appeared after two or three days and usually disappeared after two or three days and after a few days most of the patients were completely free of complaints. Late symptoms and recurring symptoms as a rule subsided quickly. However the immediate good results were disturbed at times by the immediate necrosis of wound margins frequently developed from ten to fourteen days after operation. First of all the cause of a too firmly tenacious scab of the wound because of a poor blood supply and the shifting of the wound edges.

the immediate good result of the operation. First of all necrosis of wound margins developed from ten to fourteen days after operation in most of the cases because of a too firmly tensed soft tissue suture or because of a poor blood supply to the skin in the cases in which shifting of skin flaps had been carried out. In most instances of these healed slowly without secondary infection of the brain. On the other hand the disruption of the wound margins was more dangerous. This complication also depended in part upon technical mistakes and upon increased intracranial pressure due to primary infection in the latter cases there always developed a glazed grayish and frequently exudate covered herniation increased in size. This type of disturbance gradually increased its appearance after three days after operation and occasionally after fourteen days after operation in cases in which the process of the wound appeared to be completely smooth. The subjective and objective disturbances were remarkably light. Aspiration of the wound and puncture were of no avail. It was remarkable that the brain herniation was by far not as marked as formerly when the cleaning of the wound by suction had not yet been introduced. In about one half of the cases the herniation finally cleared up and came covered with epithelium. Eight patients died as a result of this complication. The cause are proof of the fact that the success of the modern treatment does not always succeed in becoming matter of the primary infection. In cases in which the patient died during the operations Guleke employed less operations. Of these disturbances

one does not always succeed in determining the primary infection. In the cases in which the patient died in spite of hopeless operations, Guleke employed the primary clasp suture in 74 cases. Of these 38 had without the slightest wound disturbance healed without the slightest superficial necrosis of the while 20 showed mild suppuration of the middle tract around the margin of the wound.

If one compares these mortality figures with those of the World War (Gulke 1918 from 45 to 55 per cent Franz 36.7 per cent) the 39.5 per cent mortality of the 147 cases treated by Gulke at a time does not show a great difference. Nevertheless one

therefore, in 58 cases, or 80.5 per cent, a generally undisturbed healing took place.

If one, however, takes into consideration the cases of open brain injuries which were almost always accompanied by primary herniation of the brain, then among 47 sutured wounds (8 cases were tamponed), there were 20 completely smooth convalescences and 14 with very minor disturbances, 34 cases, or 72 per cent. In 13 instances the wound reopened itself secondarily, and in 8 of these cases the patient died because of secondary infection. To this number should be added 3 other cases, in which the patients died as a result of severe injuries, but presented a suppurative meningitis at the very beginning, thus the mortality was 11 cases, or 22 per cent.

Infection of the brain wound. Disturbances of wound healing occurred in the patients who were operated upon after forty-eight hours, almost twice as frequently as in those who were operated upon during the first twenty-four hours. In any event one must say that at the present time the primary wound suture is superior to the open technique of wound treatment, if one is able to operate within the first two days. Disturbances are much less to be attributed to the suture than to an insufficient cleansing of the brain wound. The degree to which it is possible to clean infected brain wounds, even in delayed operations, depends upon the individual case. Fournier attained successful results in some cases by débridement, temporary tamponade, and subsequent plastic covering of the wound. However, even in the primary operations, the suture still remains a procedure which is permissible only when the patient can remain under the care of the operator for a long time.

(TRANZ) HARRY A. SALZMAN, M.D.

Woodhall, B., and Baker, T. W. *Pneumatocele Occipitalis*. *Arch Surg*, 1941, 42: 858.

This is a case report of pneumatocele occipitalis, a very rare condition, for only 30 cases have been described in the literature. The particular group of cases to which the authors referred were pneumatoceles in the region of the occipital bone and

mastoid, so that the title could probably be extended to pneumatocele occipitalis and pneumatocele supra-mastoidea.

A typical case is reported in great detail with accompanying photographs and roentgenograms, one of which is submitted here. The authors have then reviewed the literature, in which, as mentioned before, 30 cases were discovered. In these 30 cases it was noted that the condition occurred predominantly in the male, and 1 case was noted in a patient under twelve years of age. The pneumatocele occurred spontaneously in 16 of 24 cases, in 5 the significant history of otitis media obtained, and in 3 the characteristic mass occurred following trauma to the head.

The condition is essentially one in which there is an encysted mass of air between the skull and the pericranium, and also between the bone and the dura. In the case described by the authors the mass was noted in the patient's left occipital region, which, over a period of one year, became larger and larger until advice was sought. The mass was tympanic to percussion, fluctuant, and painless. When the mouth and nose were closed and forced expiration was attempted, the mass increased in size and became tense. There was a definite pulsation synchronous with the pulse. The patient had complained of ringing and roaring noises in his ear for some considerable time, since the mass was first noticed. Neurological examination was negative. Roentgenograms of the skull revealed a lesion which resembled an epidermoid tumor.

At operation, the mass was found to contain air and pressure, and the lesion was traced down extradurally to the mastoid cells. A fascia transplant and bone wax were placed over the cells, and the defect was repaired by approximating the dura to the skull.

The underlying pathological process is that air escapes intracranially and subpericranially into the tissues through some communication between the mastoid cells and eustachian tube. This communication or fistula may occur spontaneously, through trauma, or following infection.

ADRIEN VERBRUGGHE, M.D.



Fig. 1. A, left. Roentgenogram of a pneumatocele occipitalis. B. Another view.

SURGERY OF THE THORAX

TRACHEA LUNGS AND PLEURA

Brunn H Shipman S Goldman A and Ackerman L Tuberculous Cavitation and Transpleural Decompression *J Thoracic Surg* 1941
p 485

The authors point out that certain patients with tuberculous cavitation reacted poorly to compression that their cavities enlarged rather than disappeared with such therapy and that the chief factor in such cases was the presence of dissection in the bronchus or bronchi draining the cavities involved.

They believe two of Coryllos' views to be true (1) certain cavities form as a result of partial bronchial occlusion and this occlusion acts as a one way valve which blows up structures distal to the block and (2) cavities may heal by total occlusion of the draining bronchus.

The authors believe that the two factors producing a cavity in an elastic lung are (1) the presence of a caseous focus and (2) the development of bronchial stenosis which they believe is the result of an allergic tuberculous bronchitis rather than ulceration. This process is reversible and they have observed large cavities disappear rapidly. Two patients with large tension cavities were treated by open drainage by producing a fistula by means of a skin flap. They are cured.

The authors have used the Monaldi procedure on 20 cavities in 18 patients. Three patients died. Two cavities are closed. One was treated by transpleural decompression and a skin flap the other by transpleural decompression alone. Five additional cavities show secretions negative for tubercle bacilli.

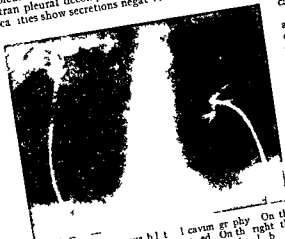


Fig 1 S multilocular bil cavities. On the left bronchus obstructed. On the right the bronchus is patent. The subcutaneous tube is in place. Tuberculosis in right lung. W. K. T.

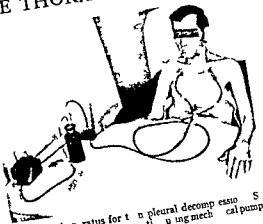


Fig 2 Apparatus for transpleural decompression. S multilocular bilateral tension cavity. Lung mechanical pump.

but the cavities are still open. In 1 case the cavity is still open but the catheter has been withdrawn and the sputum is still negative.

JULIAN A. MOORE, M.D.

Wolf J E The Possibilities and Prognoses of Suction Drainage of Cavities according to Monaldi (Ueb. Monaldi's technique and Aubertin's modification) *Sauged and nach Monaldi* *Schmied*
11 Am Ar 94 600

American investigators have produced evidence that the internal pressure of cavities is usually positive under normal conditions. As a result of the change of this positive pressure into a negative pressure by means of the suction drainage procedure, Monaldi was enabled to reduce the size of tuberculous cavities and gradually to bring them to closure.

In this curative mechanism the peripheral cavities play an important part. Surrounding the cavities there are zones of tissue with a vacuum or deficit, favorable for the healing of the cavities and in this spontaneous healing of the cavities and in this suction drainage. It is also certainly possible that certain emphases may take place under the influence of the negative pressure in the cavity with suction drainage. However, the behavior of the importance for the healing of the cavity, the behavior of the infection beneath. Under the influence of the continued suction on the wall of the cavity with subsequent linking of the bronchus.

This procedure is suitable especially for the large related cavities to which other procedures are not readily applicable. A special indication is present in giant cavities which numerous others are finally successfully influenced or are reduced to such an extent that they become amenable to other interventions. Residual cavities in plastic lung can also

be subjected to this treatment with great expectancy of success, as the author's own 2 observations show. The author has not as yet been able to achieve permanent healings. He emphasizes especially the immediate results, which are a decrease in the amount of expectoration and detoxication of the diseased body. The illustrations show a very considerable diminution of a giant cavity as a result of treatment for ten weeks.

(A. BRUNNER) LOUIS NEUWELT, M D

Vaschtschinsky, N A. Suppurative Pulmonary Processes. *Vestnik khir*, 1940, 60, 499

The author reviewed 125 cases of pulmonary supuration. His findings may be summarized as follows: 86 per cent of the patients were men and 70 per cent of them were between twenty and fifty years of age. There were twice as many smokers as non-smoking patients. Thirty-two per cent had suffered from pneumonia, 30 per cent from influenza, 12 per cent from bronchitis, and 7 from pleurisy, in other words, only in 19 could no previous affection of the respiratory tract be detected. Pneumococci were present in 90 per cent, streptococci in 33 per cent, staphylococci in 13 per cent, fusospirillary symbiosis in 2.6 per cent, and various combinations of pathogenic micro-organisms in 56 per cent.

The results of physical examination are frequently not decisive and findings characteristic for a cavity cannot frequently be seen. The temperature curve is usually irregular. A low temperature does not necessarily prove a benign character of the process.

A large amount of sputum is suggestive of a suppurative process. Malodorous sputum was found in 81 per cent of the author's material. Particles of the pulmonary tissue were present in 18 per cent and elastic fibers in 50 per cent. A diminishing number of eosinophils and lymphocytes is a poor prognostic sign.

Roentgenological examinations are of greatest importance, especially those made by the so-called tomographic method. The author rejects exploratory aspiration, considering it to be dangerous.

As to therapy, the author was favorably impressed by limitation of fluids per os and postural drainage. With the exception of neosalvarsan and emetin, no internal medication gave dependable effects. In the early stages of a putrid supuration, neosalvarsan is undoubtedly useful. Autovaccination therapy did not give encouraging results, nor did anti-perfringens serum come up to expectations. Blood transfusion may be considered only as a supportive measure. Novocaine block is not employed by the author. X-ray therapy was employed widely and furnished satisfactory results in 68 per cent, especially if the irradiations were not limited to a period of from six to eight weeks.

Surgical treatment is employed only in (1) galloping types of the process, threatening a diffuse gangrene, (2) acute septicemia, (3) frequent recurrences, (4) repeated grave hemorrhages, (5) the presence of a large sequestrum of the pulmonary

tissue located within the abscess cavity, and (6) peripheral location of the abscess.

JOSEPH K. NARAT, M D

Ormerod, F C. Some Notes on the Treatment of Carcinoma of the Bronchus. *J Laryngol & Otol*, 1941, 56, 1

The author reports the results obtained in the cases of 33 patients with carcinoma of the bronchus who were treated with radon since 1937. Eighteen other cases seen during the same period were too advanced for treatment. However, in 2 of these, lobectomy seemed feasible and the patients were referred to thoracic surgeons. The ratio between squamous-cell and non-squamous-cell tumors was 2 to 1, and it is not possible to state whether one is more likely to respond to treatment than the other. If the bronchus can be opened up and the purulent secretions evacuated, treatment is considered practical. With toxic absorption reduced, the lung is given better aeration.

Biopsy was carried out in all cases and after a week the first application of radon was made. The present dose of 10 silver seeds charged with 3 millicuries of radon was inserted into the tumor at the attached portion, into the wall of the bronchus, or even through the wall into the infiltrated lung tissue. After a period of two months a similar dose was given and if indicated, from 20 to 30 additional millicuries of radon were given after another two months had elapsed.

The expectation of life previously reported for a series of 100 cases of carcinoma of the bronchus was seven and eight-tenths months, but with these 33 cases it was reduced to five and six-tenths months. However, since some were advanced cases, 5 patients survived for only one month after the insertion of radon, 7 survived for from seven to twelve months and were much more comfortable after treatment, 9 survived for more than one year, and 3 survived for more than two years. Among the cases previously reported, one patient is alive and apparently well after five years and another is apparently well after a period of eight years.

GEORGE A. COLLETT, M D

D'Agostino, M, and Parra, M. An Experimental Study of the Production of Pleural Adhesions. (Ricerche sperimentali sulla produzione delle aderenze pleuriche). *Ann Ital di chir*, 1940, 19, 971

In operation on the thorax, particularly in drainage of the lungs, it is necessary for the pleural cavity to be absolutely closed off, and this can be accomplished only by firm adhesions between the folds of the pleura.

The authors describe experiments in bringing about such adhesions with the object of determining which are the best chemical agents for this purpose. The method used was extrapleural tamponing with gauze wet with different solutions. The animals used were 21 dogs divided into four groups. In the first group iodoform gauze was used, in the second group

Iodoform gauze wet with various concentrations of a solution of Dial in the third group simple gauze wet with aqueous solutions of lactic acid and 100 um lactate and in the fourth group simple gauze wet with aqueous solutions of bisodium phosphate

The different methods were compared as to the extent of the adhesions and the promptness with which they were formed and microscopically as to the type and thickness of the adhesions the reaction of the bed of the tampon and the microscopic findings in the lung tissue beneath the tampon

The best results were obtained with the tampon of simple gauze wet with solutions of lactic acid and sodium lactate. The adhesions obtained in this way were firm they extended beyond the tamponed zone and they were formed within four days microscopic examination showed a firm fibrous tissue uniting the folds of the pleura. The second best results were obtained with iodoform gauze and the third with simple gauze wet with bisodium phosphate. These gave moderate adhesions over only about a third of the tamponed zone. Histologically the adhesions from the iodoform gauze showed a tissue rich in fibroblasts and there was only slight injury to the lung parenchyma and the tissues surrounding the tampon while the adhesions from bisodium phosphate were made up of a loose fibrous tissue with large meshes and there was a marked degree of edema in the surrounding tissues and the lung parenchyma.

The poorest results were obtained with the Dial solution. The theory that it would increase permea-

bility of the pleura was not confirmed. Either adhesions were not formed or they were small in area and very loose and when the solutions were very concentrated there was erosion of the parietal fold of the pleura. The adhesions were chiefly fibrous with a histiocytic perivascular reaction and there was wax degeneration of the intercostal muscles and intense exudation in the alveoli of the lungs.

ANDREY G. MORGAN, M.D.

HEART AND PERICARDIUM

Fell H. and Beck C. S. Coronary Sclerosis and Angina Pectoris. *J. Thorac. & Su.* 2, 1941, 10, 519.

A follow up study of 30 patients with coronary sclerosis and angina pectoris treated by the Beck operation is presented. The first patient was operated upon February 23, 1935 and the last April 19, 1938.

There were no immediate operative deaths but there was a total mortality of 33 1/3 per cent. Of the 20 living patients 13 showed definite improvement. Their clinical symptoms were so changed that they could resume their previous occupations. Four patients showed moderate improvement and in 3 there was no improvement.

The authors believe that the results justify limited application to human patients. The experimental evidence is good and the improvement in some of the patients has been almost incredible.

JULIAN A. MOORE, M.D.

THE PRESENT STATUS OF PERITONEOSCOPY

Collective Review

ARNOLD STARR, M D , F A C S , and HOWARD FRANK, M D , Boston, Massachusetts

ALTHOUGH the diagnosis of intra-abdominal disease can usually be established by clinical, laboratory, and roentgen-ray investigation, certain intraperitoneal lesions have defied precise recognition by any measure short of laparotomy. The development by Ruddock in 1935 of a satisfactory instrument and technique for inspection of the peritoneal contents has provided a means of visualizing the surfaces of abdominal organs without recourse to operation. Ruddock's report, in 1937, of peritoneoscopy in 500 cases stimulated widespread interest in the possibilities of the procedure. Since his report, the method has been used in many medical centers and an extensive experience has accumulated. But while those familiar with peritoneoscopy have extended the indications for its use in some directions and narrowed them in others, many do not make use of the procedure at all. An appraisal of the status of peritoneoscopy, therefore, seems desirable at this time and will be made on the basis of the following considerations: (1) What does peritoneoscopy offer? (2) What are its limitations, hazards, and complications? and (3) Does it lend itself to easy and general applicability?

THE SCOPE OF PERITONEOSCOPY

The greatest usefulness of peritoneoscopy lies in diagnosis. Except for laparotomy, peritoneoscopic examination provides the only direct method of examining the peritoneal cavity and its contents. The presenting surfaces of the liver, gall bladder, stomach, omentum, intestine, pelvic viscera, and parietal peritoneum can usually be readily inspected. Additional information can be obtained by the use of a visceral retractor passed through another trocar. A lighted tube passed through the nose or mouth to the stomach for transillumination may permit the detection of mural tumors of its anterior wall. Permanent records of pathological changes noted can be made by photography.

The impressions gained by inspection can be confirmed and supplemented in certain instances by biopsy of small pieces of tissue which can be taken for histological examination. Solid tumor

masses, growths on the surfaces of solid organs, and deposits on the omentum and parietal peritoneum are most safely biopsied. Lesions of the liver lend themselves especially well to biopsy because of their accessibility.

Although peritoneoscopy has been used to diagnose a large variety of abdominal lesions, and in many instances has yielded information otherwise not obtainable, its major usefulness is in answering certain specific questions, notably (1) Is metastatic disease present especially in the liver? (2) Is ascites due to hepatic or peritoneal disease? (3) What is the nature of the enlargement of the liver or spleen or of another intra-abdominal mass? The advantages of the small incision, minimal operative trauma, small expense, and short hospital stay, all combine to make peritoneoscopy preferable to laparotomy for diagnosis in those instances in which the information required is not otherwise obtainable. It is well known that abdominal exploration in cases of carcinoma of the stomach with liver metastases entails a high mortality. When there is marked debility, it is especially worth while to avoid a fruitless laparotomy, particularly for inoperable malignant disease. The examination of the liver to exclude metastatic malignancy is a proper preliminary to the radical excision of carcinoma of the gastro-intestinal tract. In patients who have undergone resection of malignant intra-abdominal disease in the past, the occurrence of a new illness may require the consideration of further surgery. The knowledge of whether or not the liver harbors metastases from the earlier lesion may be important in the decision as to course of action. There is a small group of patients who suffer from abdominal disease which cannot be clearly diagnosed, and in whom the severity of the illness does not warrant laparotomy, in these patients peritoneoscopy may contribute to the diagnosis. For example, inspection of the pelvic organs may reveal the cause of an ovarian dysfunction. Peritoneoscopy may be substituted for bimanual examination of the pelvic organs when vaginal examination is not desirable or possible. The use of peritoneoscopy, however, for random exploration as in cases of fever of unknown origin has not been found to be helpful.

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Of primary importance is the reliability of information gained by peritoneoscopy. In a great measure this will depend upon the experience of the examiner. Several series of cases have been reported in which peritoneoscopic diagnoses have been checked by those made after operation or autopsy. In general the accuracy of the peritoneoscopic diagnosis has been high surpassing that attained by other clinical diagnostic methods. This is true particularly when pathological changes are visualized. The taking of an adequate biopsy increases the precision and accuracy of the examination. Peritoneoscopy cannot be depended upon to rule out the presence of any abdominal disease since only a limited portion of the abdominal cavity and its contents can be seen. Negative findings have limited weight.

Certain operative procedures have been done through the peritoneoscope. Adhesions have been severed, cysts tapped, abscesses drained, fallopian tubes occluded by coagulation, inguinal hernial rings sutured from within, and radiopaque media injected into hollow organs. The introduction of a second instrument through a separate incision is required to permit the performance of most of these operations under direct vision. These procedures are certainly more properly done by the usual surgical approach. In isolated instances their performance through the peritoneoscope may be justified.

When used with the required experience and with an appreciation of what the method can and cannot do, peritoneoscopy has proved to be a highly accurate diagnostic procedure entailing a minimum of risk, inconvenience, and expense to the patient.

LIMITATIONS, HAZARDS AND COMPLICATIONS OF PERITONEOSCOPY

An understanding of the limitations of peritoneoscopy will avoid the dissatisfaction with the method that arises from its indiscriminate use and will lead to a proper selection of cases in which helpful information can be expected. Some of the limitations are inherent in the method while others diminish with increasing experience. Only the anterior surfaces of the accessible viscera can be seen. Lesions involving the posterior aspects of these organs and lesions of organs which can not be seen at all of course cannot be diagnosed by peritoneoscopy. The presence of numerous abdominal adhesions may make a satisfactory examination impossible. Clearly the significance of negative findings will depend upon whether the organ in question is in the field of vision. A complete abdominal examination cannot be made

with the peritoneoscope. The extension, fixation or mobility of tumors cannot be determined hence the method should not be used to decide operability except when the presence of apparent metastatic lesions settles the issue. The absence of metastases on the surface of the liver does not exclude intrahepatic involvement.

Some experience is required to gain a correct visual impression because of the small field the color changes produced by artificial light and the distortion due to the lens system. Increased familiarity with the method minimizes the difficulties. Even a biopsy may be misleading. Small bits of tissue may not be adequate for correct interpretation by the pathologist. For example a biopsy from the surface of the liver must necessarily include the subcapsular fibrous strands which have on occasion led to the erroneous diagnosis of cirrhosis. The taking of a biopsy through the peritoneoscope requires complete familiarity with the instrument and its manipulation as well as an ability to orient oneself within the abdominal cavity and to recognize normal and pathological conditions. The removal of tissue for microscopic examination alone cannot be substituted for careful systematic gross examination.

Unfortunately the help which peritoneoscopy might offer in the differential diagnosis of acute abdominal lesions is distinctly limited by the danger that infection may be disseminated by the introduction of air under pressure throughout the peritoneal cavity. Its use in the diagnosis of ectopic pregnancy however may be an exception.

The widespread adoption of peritoneoscopy has been retarded by a fear of its dangers. When the examination is carefully performed these hazards are largely theoretical since in large series of cases reported the operative accidents have been strikingly few. Nevertheless the possibility of serious complications does exist. Most of the accidents reported have been either perforation of the stomach or bowel or hemorrhage. Perforation of the gastro-intestinal tract has occurred almost always as a result of fixation of the stomach or bowel to the anterior abdominal wall by adhesions. In all reported instances the injury has been recognized and repaired immediately without mortality. Although in the introduction of the instrument the trocar may inadvertently be pushed into a low lying or enlarged liver or other solid viscus with resultant serious hemorrhage, bleeding is usually the result of biopsy and the only death in Ruddock's series of 900 cases occurred from a biopsy of the liver which was followed by persistent hemorrhage. Effective coagulation of the biopsy site will effect hemostasis.

The possibility of air embolism must be considered. Although not reported as a sequel of peritoneoscopy, fatal air embolism following pneumoperitoneum for the treatment of tuberculosis has been observed. Marked fluctuation of the blood pressure or vasomotor collapse have occasionally been seen in patients with cardiovascular disease.

The less important complications of peritoneoscopy are hematoma or sepsis of the abdominal wall, subcutaneous emphysema, transient shoulder pain, and persistent leakage of ascitic fluid.

THE GENERAL APPLICABILITY OF PERITONEOSCOPY

The ease of performance and general applicability of peritoneoscopy should be carefully considered when the decision for or against the adoption of the method is made.

There are very few patients upon whom peritoneoscopy cannot be safely performed. In fact, it is often reserved for the patient who is a poor risk and seems unable to withstand larger operative procedures. Very often these are people of advanced age. Frequently, peritoneoscopy may be applied in the elucidation of diagnostic problems in infants and children as well.

While the instrument is expensive, many institutions have found that the saving of hospital days soon repays the cost. The peritoneoscope needs the same kind of care and sterilization as the cystoscope, and since sterilization requires many hours, no more than one patient can be examined in one day with the same instrument. More rapid chemical sterilization may become feasible.

To avoid infection, rigid aseptic surgical technique is necessary. The usual preparation of the field should be done as for laparotomy. A source of contamination is the unsterile face, eye, or eyeglass applied to the eyepiece of the peritoneoscopic telescope. This can be avoided by shielding the eyes with sterile spectacles and adequate face masking. The pumping of unfiltered air into the peritoneal cavity apparently does as little harm as in an artificial pneumothorax or in encephalography.

Peritoneoscopy is best carried out in a fully equipped operating room which will afford the proper tilt table, suction, lighting, and trained assistance. Should an accident occur, laparotomy can be done with a minimum of delay.

In most instances peritoneoscopy can be performed satisfactorily under local infiltration anesthesia. An intravenous barbiturate will serve as

a useful alternative. During the induction of pneumoperitoneum, the patient may have slight transient pain, but if the manipulations are gentle and if moderate pre-operative sedation has been given, there will be a minimal degree of discomfort. An occasional patient unsuitable for local anesthesia will require a general or spinal anesthetic. Young children should be examined under general anesthesia. In any case, a trained observer should keep a record of the patient's reaction to the procedure.

The introduction of the instrument requires no special training. The only points of the procedure which may offer some technical difficulty to the beginner are the insertion of the pneumoperitoneum needle through the abdominal wall into the peritoneal cavity, and the creation and maintenance of a good pneumoperitoneum. These mechanical problems are readily mastered with some little practice. Orientation within the abdominal cavity and the interpretation of what is seen are more difficult for the novice, and it is in these respects that experience in the use of the instrument is required.

Since the information obtained by peritoneoscopy increases with the experience of the examiner, it has usually seemed desirable to delegate this procedure to a special group. Some have believed that the endoscopist who performs bronchoscopy, gastroscopy, or esophagoscopy is best equipped, while others have recommended the urologist because of his experience with cystoscopy. Of major importance is the ability to recognize the gross pathology of abdominal disease, and in this respect, the general surgeon is best prepared. Certainly, he is best able to handle accidents should they occur. Complete endoscopic services are found in only a few of the larger medical centers, and there seems to be no reason to confine peritoneoscopy to those places. Any surgeon who desires to use the instrument can readily familiarize himself with the technique.

As is the case in the pioneer phase of any new approach to diagnosis, the initial enthusiasm for peritoneoscopy has resulted in its use for the diagnosis of a great assortment of abdominal lesions. Several therapeutic ventures have been undertaken through the peritoneoscope. At present, it would appear that many of the conditions for which peritoneoscopy has been done are more accurately and more easily diagnosed by other methods, and that the occasion for therapeutic operation through the instrument must be exceptional. It has been suggested that post-mortem peritoneoscopy might prove enlightening when an urgently desired autopsy is not obtainable. A

field of usefulness for peritoneoscopy not immediately related to clinical diagnosis but which may become significant is the opportunity provided for physiological investigation of the abdominal viscera in the intact unanesthetized subject.

In the future a more widespread but discriminating use of peritoneoscopy for the solution of special diagnostic problems may be expected. Within the limited scope of its usefulness it should become an accepted and routine adjunct in diagnosis.

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SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

Smith, D W., and Bates, W. The Surgical Significance of Pain in the Abdominal Wall (*Surgery*, 1941, 9: 741)

Abdominal pain due to neuralgia of the nerves supplying sensation to the abdominal wall is of extremely common occurrence. Various writers give different values for its incidence, but all students of the subject agree that it accounts for many obscure abdominal symptoms. Of 110 nurses examined, 36 per cent showed some spinal abnormality, and half of this group presented evidence of spinal-nerve root pressure or irritation which was demonstrated by hyperalgesia over the corresponding nerve distribution. A great number of grave intra-abdominal lesions may be simulated and correct diagnosis may save many needless operations.

The neuralgias are held to be due to postural traumatic injuries involving the nerve roots or to toxic manifestations of acute diseases caused by infections.

The diagnosis of abdominal-wall or parietal neuralgia is not difficult. Pain, being a purely subjective symptom, is less dependable than its objective manifestation, tenderness. The examiner's fingers should dip more or less deeply into the abdomen in order for the relaxed muscles to offer counter resistance to demonstrate the abdominal-wall tenderness. Further examination should be made with the muscles tense in order to protect the underlying viscera. The examiner should pinch or poke the skin, whereupon, in neuralgia, tenderness in the skin will be noted. The tenderness of an abdominal-wall neuralgia is unmistakable. It is unchanged over a voluntary tensed abdomen and is readily elicited by the pinch test. It usually extends over a greater area than the actual pain complained of, and may involve the entire distribution of the nerve. Regardless of the intensity of the pain, rigidity is usually absent as motor fibers are rarely involved.

Nerve block with 2 per cent procaine solution will clearly demonstrate the neuralgic character of the pain, and will frequently afford relief for weeks or months.

In considering abdominal neuralgia as a possible diagnosis of abdominal pain, one must be careful to rule out any possible intra-abdominal lesions. It would be far better to remove erroneously a normal appendix than to allow a gangrenous appendix to rupture. There is a definite risk, however, in any laparotomy, and all unnecessary ones should be avoided.

The treatment of the majority of these types of cases consists merely of the correction of postural defects, and of the usual medical management of a toxic or infectious condition.

JOHN W. FROST, M.D.

Greco, A. A Study of Mesocolic Hernia—the Intra-mesocolic Variety (Contributo allo studio delle ernie mesocoliche—varietà intramesocoliche) *Arch Ital di chir*, 1940, 59: 560

There are two varieties of hernia of the transverse mesocolon, the one called transmesocolic, in which the opening extends through the whole mesocolon and the herniated loops of small intestine pass directly into the omental bursa, and the other called intramesocolic, in which the breach is through only part of the four layers of the mesocolon and the herniated intestine is covered with a cap made up of the other layers. The anatomy of the region is described and illustrated with diagrammatic drawings.

The author describes a case of the intramesocolic variety. This is much rarer than the other variety and only 7 cases have been described in the literature. The patient was a woman of twenty-eight who was found to be suffering with carcinoma of the stomach but had refused operation. She was suddenly taken with intense abdominal pain, and examination showed the signs of intestinal occlusion. Operation showed an opening in the transverse mesocolon through which about a meter and a half of small intestine had herniated and become strangulated. It was easily reduced and the opening sutured. The carcinoma of the stomach was found to be inoperable and the abdomen was closed. The patient made an uneventful recovery from the operation.

It may be possible to diagnose an internal hernia by roentgen examination, but the exact nature of the hernia can be determined only at operation. This may be a difficult task if the intestines are dilated with gas and displaced as a result of the hernia. A search must be made for the transverse mesocolon. This may necessitate evisceration of the small intestine. If the colon is lifted up the hernial ring can be seen. Reduction is generally easy, as the opening is apt to be large. After reduction the hernial ring is closed. Care must be exercised to avoid the vessel arches that run in the mesocolon, for if they are punctured by sutures it may cause gangrene of the colon.

AUDREY G. MORGAN, M.D.

Maingot, R. The Floss Silk Lattice Posterior Repair Operation for Direct Inguinal Hernia (*Brit M J*, 1941, 1: 777)

Maingot describes his modification of the posterior reconstruction operation for direct inguinal hernia, with floss silk instead of fascia lata, and a variation of the pattern of the darn. In this type of hernia the author neither disturbs the sac nor in any way attempts to ligate or invaginate it.

The object of the operation is to produce a solid, flat, uniform fibrous silk sheet to protect the whole of the posterior wall of the inguinal canal and at the same time provide a suitable aperture for the passage of the cord at a newly constructed and more laterally

placed internal ring This is obtained by constructing a lattice with a 50 in strand of floss silk threaded on a small curved round bodied trocar pointed needle. The cord is lifted upward and out of the way and the suture is introduced by taking a good bite of the deep a part of Poupert's ligament first of all at its point of insertion into the pubic spine and then through the lateral tendon as fibers of the rectus muscle at its origin from the body of the pubis.

The edges of the aponeurosis of the external oblique muscle are then sutured behind the cord thus being placed subcutaneously. The wound is now closed.
J M MORA M.D

Campellone P Results of the Operation for Inguinal Hernia According to the Method of Bassini Modified by Baggio (1 in 1000 of the Bassini operation performed by Baggio) 4 4 101
d ch r 94 59 432

Campellone states that Baggio's modification of Bassini's operation is in regular use at the clinic of Psa. The modification includes:

1 Constant opening of the transverse fascia and its reconstruction as a plane by itself as found in nature.

2 Utilization of the rectus muscle after opening its sheath the opening is made along the lateral border of the sheath between the conjoined tendon and the transverse fascia. In this manner the muscle is used to a greater extent and more radically than recommended by Bassini.

3 The conjoined tendon and the marginal remnant of the small oblique and transverse muscles are applied over the rectus muscle. Catgut sutures fix these tissues to the subjacent muscular plane and (like the rectus muscle) to the posterior border of the inguinal ligament.

4 Laterally to the rectus muscle the plane is extended by means of a suture (extreme lateral ure) only the small oblique and transverse muscles are caught and the suture is passed through their full fleshy part on the other side (ver inguinal bundles). The suture which follows medially catches together the inguinal bundle of the six muscles superficially and the rectus muscle below. Still more medially the planes remain separated the rectus muscle with four sutures in the deep plane the inguinal bundles of the small oblique and transverse muscle or the conjoined tendon superficially.

5 The sutures which fix to the arch the rectus muscle and the small oblique and transverse muscles laterally to it are silk sutures forming a vertical U which embrace the hole and the contact surface between the arch and the muscles.

6 The lateral flap of the cremaster muscle obtained during the operation of the hernia is placed over the transverse plane and sutured with three or four catgut sutures the upper flap of the cremaster has been united with the mass of the small oblique and transverse muscles. The other steps are those of Bassini's operation.

Among 230 patients admitted in the method of these were operated upon with Baggio's method 191 had external inguinal hernia 91 had primary external and internal combined 172 had simple hernias and 19 had recurrences 172 had simple hernias and 19 had complications in the form of strangulation. No recurrence of the hernia was found in any of these 200 patients on follow up.

When the femoral canal has been efficiently closed from above the suturing is continued laterally, the conjoined tendon and internal oblique muscle being drawn over to the shelving edge of Poupert's ligament until the internal ring is reached. The stitches are placed almost vertical and side by side and must not be pulled upon in such a way as to strangulate the tissue or to drag the inguinal ligament out of its normal alignment. When the internal ring is approached the cord is drawn firmly outward and slightly downward and the upper and outer margins of the internal oblique are retracted upward and outward. The internal ring or rather the femoral ring should always be reinforced and in placing it as far as possible from the cord no care should be taken not to compress the abdomen daily at its point of emergence from the abdomen. This reinforcement is best carried out as follows:

The floss silk is knotted or locked on the curved edge of the internal oblique muscle just above the reflected cord. It is carried transversely above the cord passed through the internal oblique muscle and locked and then passed downward to the cord the edge of the inguinal ligament lateral to the cord. Lastly 3 sutures are repeated at each angle so that the being knotted or locked and surrounded by a emerging cord is buttressed and surrounded by a double ring of reinforcing floss silk. From this point the suture is carried toward the medial end of the canal with a wider transverse the external oblique muscle or conjoined tendon being picked up and this structure being anchored to the inguinal ligament.

At the extreme medial point of the canal the free end of the suture after once again passing through Gimbernat's ligament through the peritoneum of the pubic spine and through the fibers of the rectus muscle is tied to the end which was left long and is steadied with artery forceps.

examination the time elapsed since the intervention varied from a minimum of six months to a maximum of four years

RICHARD KEMEL, M D

Di Molfetta, N A Contribution to the Study of Vasolacunar Femoral Hernia (Contributo allo studio dell'ernia crurale vasolacunare) *Arch ital di chir*, 1940, 58 177

Di Molfetta reports 2 cases of femoral hernia, one unilateral and the other bilateral, in which careful examination left no doubt that the hernial sac was directly in contact with the bare femoral vein. He calls attention to the classification of femoral hernias into intravaginal and extravaginal and finds it irrational as long as anatomy has not definitely decided whether the femoral vessels have a common or an individual sheath, or a special anatomical formation which contains them. The opinions of the authors disagree on the anatomy of the femoral canal, the vascular sheath, and the femoral septum. Therefore, Di Molfetta has used the only sure method of studying the anatomy of the inguinal femoral region: he has made serial sections of 8 embryos, varying in vertex-coccyx length from 1 to 22.8 cm, of 1 newborn, of 1 child aged four years, and of 1 adult. The findings did not change with age, except for greater robustness assumed by the anatomical formations of the region, and can be summarized in the following statements:

1. The femoral canal is formed by the splitting up of the fascia lata into two leaflets which constitute, respectively, the anterior and the posterior wall of the canal (Fig 1). The canal is filled with loose connective tissue, containing fat, which surrounds the femoral vessels, insinuates itself between artery and vein and forms a fatty cellular bed for the protection of the vessels. The leaflets of the fascia lata give off partitions which form a variable network in the connective tissue of the canal and serve to support this tissue, but without subdividing the canal into separate venous and arterial portions.

2. The femoral vessels are not surrounded by a proper vascular sheath, but only by the connective tissue of the canal, which tissue is a continuation of the connective tissue that surrounds the iliac vessels.

3. The transverse fascia, originating from the anterior abdominal wall, is inserted on the posterior border of the inguinal ligament and then behaves in a different manner medially and laterally. Medially, it is directed backward and upward and is inserted on the pubis, and thus forms the femoral septum; laterally, it continues downward toward the femoral vessels and disappears gradually at the back of their walls. This prolongation between the inguinal ligament and the walls of the vessels forms a recess filled with the connective tissue which is an extension of the preperitoneal connective tissue; this constitutes the principal anatomical factor in the predisposition to the formation of a hernia.

4. The hernia which occurs in this region and runs through the canal at the back of the vessels deserves the name of vasolacunar hernia. It plunges into the loose connective tissue which surrounds the vessels and gradually forces apart its meshes. The same formations, i.e. the walls of the lacuna and of the femoral canal, always surround the vasolacunar hernia. As the femoral vessels have no proper sheath, a distinction between an intravaginal and an extravaginal hernia is doubtful and cannot be accepted.

5. Clinically, four varieties of vasolacunar femoral hernia can be distinguished; they depend on the principal topographic relations to the femoral vessels: the prevascular and retrovascular, which are respectively in front and back of the vessels, and the medial and lateral, which are respectively in contact with the vein and the artery. These relations to the vessels may change during the evolution of the hernia, and depend on the separability of the space with which the hernia is confronted.

RICHARD KEMEL, M D

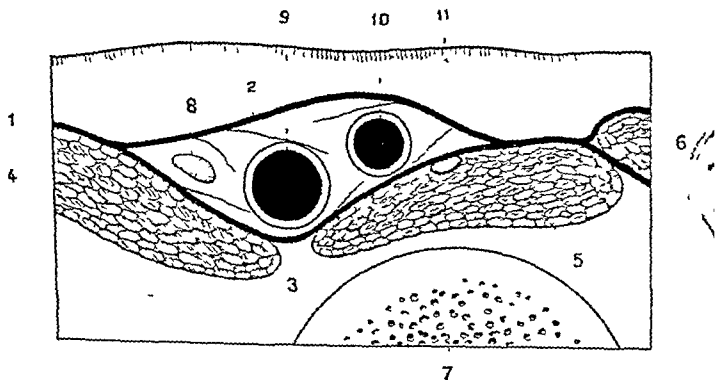


Fig 1. Schematic drawing representing the transverse section of the lacuna of the femoral vessels in the adult: 1, fascia lata, 2, its anterior leaflet, 3, its posterior leaflet,

4, pectineus, 5, iliopectineus, 6, sartorius, 7, femoral head, 8, lymph node of Cloquet, 9, femoral vein, 10, femoral artery, 11, femoral nerve.

Apparently peritoneoscopy has not received the attention to which it is entitled for this reason the author has gone to a great deal of trouble to express very clearly its indications and contraindications. He believes that if these were better understood the correct use of the peritoneoscope would bring about more accuracy in diagnosis and more correct treatment. Many operative procedures would be avoided and much less morbidity would be encountered. This then is a plea for the considered and practical use of the peritoneoscope by the surgeon familiar with its use.

INDICATIONS FOR PERITONEOSCOPY

- The use of the peritoneoscope is indicated in the following conditions
- 1 Non inflammatory disease of any of the organs within the greater sac of the peritoneal cavity excluding the contents and borders of the lesser sac the pancreas the kidneys and other retroperitoneal structures with certain exceptions
 - 2 A pancreatic growth particularly one interfering with the continuity of the common bile duct or one suspected of metastasis
 - 3 A retroperitoneal mass (for determination of the location of an intra abdominal mass with relation to the peritoneum)
 - 4 A suspected neoplasm or anomaly of any of the pelvic organs including endometriosis
 - 5 Old chronic inflammatory disease of any of the pelvic organs
 - 6 Suspected ectopic pregnancy
 - 7 Splenomegaly or hepatomegaly
 - 8 Ascites not of cardiac origin
 - 9 Tuberculous peritonitis
- INDICATIONS FOR PERITONEOSCOPY
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CONTRAINDICATIONS FOR PERITONEOSCOPY

The use of the peritoneoscope is contra indicated in the presence of

Any acute inflammatory disease of the ab-

dominal cavity or any other process in an advanced

- The use of the peritoneoscope is contraindicated in the presence of
- 1 Any acute inflammatory disease of the abdominal cavity
 - 2 Pneumonia pulmonary abscess in an advanced stage or disease of the pleura
 - 3 Advanced pulmonary tuberculosis
 - 4 Any disease or lesion in the thorax extending into or communicating with the abdomen
 - 5 A stab wound or bullet wound of the abdomen
 - 6 Intestinal obstruction or advanced distention of either the small or the large intestine
 - 7 Acute perforation of any viscus
 - 8 Heart failure or cardiac decompensation in the absence of ascites and in the presence of ascites except in certain specially selected cases
 - 9 Extensive operative scars and adhesions
- thereto. Laparoscopy is a great diagnostic aid in these indications and contraindications to laparoscopy is a great aid to the surgeon on the use of the peritoneoscope.

From these indications and contraindications it appears that peritoneoscopy is a great diagnostic aid to the clinician. The author goes on to mention in particular the kind of cases in which the use of the peritoneoscope is indicated and in each case

For instance in neoplasms of the stomach it is often extremely difficult to determine the presence or absence of metastases in the liver without exploratory laparotomy but Behing points out that in no way can laparotomy especially exploratory laparotomy compete with peritoneoscopy because peritoneoscopy is entirely a diagnostic procedure whereas exploratory laparotomy should be employed almost entirely for therapy and very rarely if at all for diagnosis. Certainly if diagnosis can be obtained by other means exploratory laparotomy is unwise. From the point of view of the peritoneoscopist neoplasms of the stomach should be divided into two groups in which obstructive lesions are likely to occur.

From the point of view of the peritoneoscopist, neoplasms of the stomach should be divided into two groups: those in which obstruction is likely to occur and those without obstructive lesions. In the first group of course, peritoneoscopy is of no value whatever because operative procedures will be required to remove the obstruction or obstructive symptoms. However, those without impending obstruction fall into the question of operability. In the second group, the presence or absence of metastases depends on the presence or absence of fixation to some extent on the presence or absence of fixation of the organ. Ruddock in describing the results in 900 cases subjected to peritoneoscopy reports approximately 90 per cent accuracy in recognition of metastases to the liver with the peritoneoscope.

Most neoplasms of the alimentary canal and therefore peritoneoscopy is not indicated because operation must be undertaken for the impending obstruction. There are rare cases however in the caecum in which it would be wise to know first whether there are metastases in the liver before any operative procedure is carried out.

The relationship between hepatic congestion and metastases is an important one.

There are a number of factors which suggest that it would be wise to know whether or not metastases in the liver before any of these procedures is carried out. The differentiation between hepatocellular carcinoma and cirrhosis is important and the degree of differentiation is a factor in determining whether a new procedure is warranted, especially in the case of a patient with a known history of liver disease.

[illegible]

very helpful. A large cyst of the pancreas may be seen, but the instrument is not of value in determining other diseases of the pancreas.

With regard to the spleen, visualization of the spleen is often difficult, but for practical purposes it is often possible to determine whether a lesion is attached to the spleen or whether it is retroperitoneal, thus the proper method of surgical approach will be indicated. The instrument can be used to differentiate between intraperitoneal and retroperitoneal masses, which is of great practical value to the surgeon before operation.

In obscure cases of growth in the pelvis, or suspected pelvic growths, peritoneoscopy may be of great importance. For instance, rare cases of papillary cyst adenoma of the ovary may be seen, and it may be determined whether the condition has remained local or not. Endometriosis may be observed by visual examination, and this examination may determine the amount of involvement of the anterior wall of the rectum and disclose the amount of endometrial tissue in the pelvis. In instance, in an elderly woman with a large ovarian cyst, it was possible to tap the cyst under direct vision through the peritoneoscope.

It is suggested that all hermaphrodites be subjected to peritoneoscopy before plastic reconstruction of the external genitalia is considered.

Ectopic pregnancy is very accurately determined by this means.

In the past, the diagnosis and treatment of tuberculous peritonitis has been unsatisfactory. The diagnosis was usually made by performing an exploratory laparotomy, and at the time of the laparotomy the air was introduced into the interior of the abdominal cavity. Through the peritoneoscope it is possible to inspect the abdominal cavity thoroughly, a biopsy specimen can be taken, and a definite diagnosis of tuberculous peritonitis can be made, and it is possible to introduce air under tension into the abdominal cavity at the same time.

The diagnosis of abdominal ascites is often difficult, and paracentesis does not solve the problem. Those who are familiar with the visualization of the interior of the peritoneal cavity are extremely sceptical about the clinical accuracy of the diagnosis in many cases of ascites. It would appear more rational, instead of performing paracentesis, to perform practically a similar operation with the peritoneoscope with the hope of getting accurate information as to the cause of the ascites. It is also possible to remove the fluid and to obtain biopsy specimens from different levels within the abdominal cavity. Thus, it would appear that peritoneoscopy should be performed first to establish a diagnosis, and from then onward, if it is deemed proper, paracentesis should be used. According to the author, it is not justifiable to perform paracentesis before the diagnosis has been definitely established with the peritoneoscope.

The purpose of the article, as can be seen, is to bring before the medical profession the value of

this instrument so that its use may be extended, especially in the proper direction. The author believes that the use of the peritoneoscope has been neglected principally because its advantages have not been appreciated by the medical profession.

ADRIEN VERBUGGEN, M.D.

Biondo, A : Peritoneal Absorption. Absorption of Granular Substances (Contributo allo studio dell'assorbimento peritoneale. L'assorbimento di sostanze granulari). Arch. ital. di chir., 1940, 59, 172.

Von Recklinghausen first demonstrated that the peritoneum has powers of absorption. As to the details of this process there has been considerable controversy. Some have claimed that there is absorption through peritoneal stomas, but most investigators have denied the existence of such stomas. Some state that only the diaphragmatic portion of the peritoneum has this power of absorption, others report various zones of absorption in the peritoneum. There is also a difference of opinion as to whether the substances enter the lymphatics or the veins after absorption.

The author proceeded to study the problem experimentally. In his originally devised technique he used graphite as the foreign body. This he imbedded in gelatin which was solidified by cold, and was then localized to some part of the peritoneum by a purse-string suture which kept the gelatin block in place. This maneuver avoided the action of intra-abdominal currents and respiration.

The author studied absorption particularly in the anterior peritoneum, the omentum, and the pelvic peritoneum. He used a series of 12 dogs for these experiments. He opened the abdomen of different groups on the tenth, twenty-fourth, fortieth, and forty-eighth days after introducing the graphite material. The peritoneum so removed was studied by the usual histological methods. The protocols of the various experiments are presented in detail with numerous photomicrographic illustrations.

The author concludes that the granular substances traverse the peritoneum through the intercellular spaces of the endothelium. Physical factors such as pressure differences in the lymphatics and the entrance of the granular substances into the lymphatic vessels, by an aspiration-like action. The same physical factors aid their entrance into the capillaries of the vascular system. The granules thus enter the lymphatics and the blood vessels both as free granules and as phagocytized granules. The same process was observed in all parts of the peritoneum which were studied (parietal, omental, and pelvic). Neither intestinal peristalsis nor respiratory activity plays any part in this process. Such movements may at times induce an ascending current which transports intraperitoneal foreign substances toward the diaphragm.

The author has also successfully demonstrated that the diaphragmatic peritoneum is not the sole peritoneal zone wherein absorption may take place.

JACOB E. KLEIN, M.D.

Vitkin S F Prophylactic Treatment of Postoperative Diffuse Peritonitis with Vaccines

To study the efficiency of prophylactic injections of colon bacstragen or vaccine in the prevention of postoperative diffuse peritonitis the author used 62 rabbits. Three cubic centimeters of a filtered emulsion of human feces diluted 1 to 10 were injected intraperitoneally. Of 62 rabbits 52 were given the luminary intraperitoneal injections of 4 c cm of the vaccine suspended in 12 c cm of a 1 per cent solution of gum tragacanth. Each cubic centimeter of the vaccine contained 500,000,000 bacteria. The rabbits contained 500,000,000 bacteria with a successful immunization of rabbits with a fatal intraperitoneal introduction of a fatal dose of feces was followed by a clinical recovery in 73 per cent of the cases. Pathological-anatomical studies revealed encapsulated peritoneal and omental abscesses.

In the remaining 69 per cent of the cases an acute diffuse peritonitis led to a fatal outcome at an average of four days after the artificial infection. One hundred per cent of the control animals perished at an average of eighteen hours after the introduction of the infectious material into the peritoneal cavity.

The immunization of the rabbits with the vaccine was never followed by untoward results and caused a rise of the relative and absolute number of neutrophils in the peritoneal exudate. The intraperitoneal introduction of an emulsion of feces at the height of the rise of neutrophils caused by the vaccination was followed by a clinical recovery in not less than 96.3 per cent of the cases while recovery was recorded in only 48 per cent when the emulsion was introduced at the moment when the percentage of neutrophils was lowest.

The beneficial effect of immunization may be ascribed to a great extent to a delayed absorption of the infectious material from the abdominal cavity and to the phagocytic action of the neutrophils present in the peritoneal exudate.

JOSEPH K. NARAT, M.D.

Schmidt E. R. Curreri A. R. Hilde F. G. and Adash K. E. P. Peritoneal Irrigation and Chemotherapy in the Treatment of Experimental Peritonitis

In an extended series of experiments carried out in a group of dogs the authors sought to determine the difference in mortality rate in peritonitis induced by perforation or gangrene of the cecum compared with that in peritonitis due to perforation of the distal ileum. In addition they set out to ascertain the effectiveness of peritoneal irrigation toward subsequent peritonitis and the therapeutic value of peritoneal irrigations and chemotherapy in peritonitis.

The results of their experiments demonstrated that it is practically impossible to obtain a mortality of 100 per cent in peritonitis induced by cecal perforation whereas distal perforation produces a mor-

tality of 93.33 per cent thereby closely approaching the 100 per cent mortality reported by other investigators. Perforation of the distal ileum in their experimental work with dogs produced a peritonitis with a diverse bacterial flora such as is seen in human beings following gastro-intestinal perforation. With the employment of high mortality rate as a basis of measurement it was possible to estimate the value of therapeutic or prophylactic procedures that were tried in the subsequent experimental work.

Peritoneal vaccination has been used by Steinberg as a prophylactic procedure against peritonitis when peritoneal contamination seemed likely to occur during or after gastrointestinal surgery. The commonly used anticolon bacstragen which is a suspension of formalized colon bacilli in gum tragacanth and aleuronate. The agent acts on the local peritoneal resistance and its action is non-specific since the protection it affords is not limited solely to the bacillus coli but extends also to other bacilli. Other agents have been used but colon bacillus suspension appears to be the most effective. The author in their experimental work with dogs found that peritoneal vaccination with colibacstragen prior to the operative procedure of subsequent peritonitis for at least twenty-four to forty-eight hours before the operative procedure. Other investigators have obtained similar results. The effect of the vaccine is to produce a sterile peritoneal exudate rich in phagocytes and capable of combatting an infection in its early stages and subjugating it before an overwhelming bacterial growth can occur. Local tissue changes such as edema and congestion also prevent marked invasion of the tissue by bacteria. This inflammatory defensive action is a stage ahead of the bacterial offensive action following vaccination.

Peritoneal irrigation in the treatment of prophylaxis of peritonitis is a procedure arising from an old school of thought. French and German surgeons often wash out the peritoneal cavity with liberal amounts of water or saline solution before closure of each laparotomy as a prophylactic measure and also use this as a therapeutic procedure. Some investigators have used antiseptic solutions as periton irritants and have indicated some improvement over the controls. The authors of the present article have found no advantage either mechanically or chemically in the irrigation of peritonitis. In the first place the peritoneal irrigants do not reach all surfaces and often dilute the bacterial toxins that are in the exudate as well as the bacteria. Besides these bacteria, lymphatic and hematogenous channels are not reached by the irrigant.

Among the chemotherapeutic agents used by the authors in their experimental work were sulfanilamide, neoprontol, promine and related drugs. The physiological immunity reaction necessary for overcoming physiological immunity reacts in necessary

to combat the invading bacteria. These drugs are most effective against certain hemolytic streptococci, and the bacillus coli and bacillus welchii, the two organisms most commonly found in any case of peritonitis following gastro-intestinal perforation. The experimental work tended to show that the earlier the drug is given in the course of an infection the better are the results obtained.

MATHIAS J. SEIFERT, M.D.

Lattanzio, R. An Experimental Contribution to the Treatment of Peritonitis Due to Perforation (Contributo sperimentale alla cura delle peritoniti da perforazione) *Arch. ital. di chir.*, 1940, 59 54

Lattanzio has made an experimental study on 25 rabbits to determine the usefulness of capillary drainage in acute generalized peritonitis which was induced in the following manner: the animals were laparotomized, a perforation having a diameter of about 1.5 cm. was made in the free border of the large intestine, fecal material was expressed from the intestine into the peritoneal cavity, and the abdomen was closed. Acute generalized peritonitis resulted in every case. The animals were divided into three groups: two of 9 animals each and one of 7 animals. Four or six hours after the first intervention, the abdomen was reopened, the perforation sutured, the peritoneal cavity cleansed, and the abdominal wall completely closed in the first group, in the second group pure or diluted cod-liver oil was introduced into the peritoneal cavity before the closure of the abdomen. Six hours after the first intervention, the operation performed in the first group was repeated in the third, but capillary drainage was provided through the abdominal wall. All animals of the first two groups died and 4 of the third group survived.

There cannot be any doubt as to the efficacy of the drain in conveying the infected peritoneal exudate to the outside. In the 3 animals dying in the third group, the drain was soaked with exudate, hardly any of which was found left in the peritoneal cavity. In all of the drained animals, the internal layers of the dressing were saturated with exudate, while the external layers were dry, excluding any extraneous cause of wetting. The drains were removed on the third day and it was found that the discharge then tended to disappear and that the general condition of the animals improved at the same time. The survival of the 4 animals in the third group cannot be attributed to an attenuation of the peritonitic process, in fact, they were placed in a more disadvantageous position than some rabbits of the first and second groups, in which only four hours were allowed to elapse between the two interventions. In addition, all animals were operated upon with the same technique, and the presence of hemorrhagic exudate and of feces, together with the aspect of acute diffuse peritonitis, was found in every case at the second intervention. The time of survival after the appearance of peritonitis was shortest in

the first group, slightly higher in the second, greater in the rabbits which died spontaneously in the third group, and practically unlimited in those which were sacrificed. No extensive adhesions were found in the drained group, necropsy of the 4 surviving animals killed at varying intervals showed that the thickness and extent of the adhesions decreased with the increase in time elapsed since the beginning of the peritonitis. This confirms the concept that the formation of adhesions depends principally on the constitutional terrain of the individual. The introduction of cod liver oil at body temperature into the peritoneal cavity seems to have been of little help.

From the clinical point of view, the advantages of drainage seem to be beyond doubt. However, this does not mean that every case of perforation peritonitis should be drained if it is possible to intervene shortly after the traumatism, or if there is little soiling of the peritoneal cavity, especially in lesions of the stomach or small intestine which can be thoroughly repaired, the abdomen may be closed without drainage. In all other cases, drainage (preferably capillary) in the vicinity of the lesion or at the lowest point is indicated. The drain should be removed as soon as the general and local conditions show decided improvement. RICHARD KEMEL, M.D.

GASTRO-INTESTINAL TRACT

Tesoriere, A. The Pathogenesis of Hyperazotemia in Gastroduodenal Hemorrhages (Sulla patogenesi dell'iperazotemia nelle emorragie gastro-duodenali) *Arch. ital. di chir.*, 1940, 59 207

Tesoriere recalls that Sudek accidentally found a marked hyperazotemia in a patient with bleeding duodenal ulcer and subsequently made the same observation in 7 other patients. This phenomenon was confirmed by various clinicians who advanced different explanatory theories which are poorly supported by experimental results. To investigate the causes which determine the hyperazotemia of gastroduodenal ulcer, the author has instituted a series of experiments on dogs from which he concludes:

- 1 External hemorrhage does not produce any demonstrable change in the azotemia because, in the restitution of the blood mass, the fluids subtracted from the tissues carry with them a certain amount of nitrogen.

- 2 The administration of blood causes an increase in the azotemia not exceeding that of a casein meal, and the azotemia curve reaches a higher level if the blood is given to the same animal from which it has been taken.

- 3 The increase in azotemia is proportionate to the amount of blood that has been subtracted and then administered.

- 4 The administration of casein and urea is capable of producing hyperazotemia in a dog that has been bled.

- 5 The ingested blood is nearly completely absorbed in animals that have been kept on a non-protein diet for several days.

6 The elimination of nitrogen in the urine is earlier and more rapid in dogs that have not been bled than in those which have been submitted to bleeding

The data obtained seem to demonstrate that in animals in which the mass of blood has been reduced by bleeding the rapid absorption of the nitrogen present in the administered blood leads to a primary rise in the azotemic curve which is then kept high either by the subsequent supply of products of the digestion of proteins of the tissues for the restitution of the blood mass carry some nitrogen with them. The fact that the administered nitrogen is eliminated in the course of a few days by the dogs that have been bled while it is eliminated rapidly by the dogs that have not been bled would seem to explain why in the first case the azotemic curve is kept high for a longer period. Comparison of the hyperazotemia obtained experimentally by the author with some much higher values found in patients having gastroduodenal hemorrhage suggests that in these cases other causes are superimposed on those mentioned by him for instance a renal lesion which in fact is found rather frequently

RICHARD KEMEL M D

Sosnyakov N G Diagn stic Difficulties in Perforated Peptic Ulcers *Vest kkk r* 1940 66 533

In spite of a clear cut picture of a perforation of a gastric or duodenal ulcer not infrequently difficulties arise in the differential diagnosis. The condition may be mistaken for an acute appendicitis or conversely a cystitis or intestinal obstruction and in reality a perforated ulcer may be expected when in reality acute appendicitis pneumonia diaphragmatic pleurisy angina pectoris or perforation of some other abdominal viscus is present

X ray examinations analysis of the blood and rectal examination are helpful in the diagnosis

In 7 of 180 cases of perforated gastric or duodenal ulcers a wrong diagnosis was made

JOSEPH K HARAT M D

Jacobellis P Gastric Function in Ulcer of the Duodenum (*Funct n th gastrica negli ulcers duodenali*) *Ann ital d chir* 194 19 7 1

The reports on acidity of the stomach contents in ulcer of the duodenum have varied greatly some authors reporting hypacidity or anacidity others normal acidity and still others hyperacidity. This may be due partly to the different methods used for determining the acidity and partly to the fact that the determinations were made with different degrees of fullness or emptiness of the stomach

The author made a series of determinations of gastric acidity in cases of duodenal ulcer diagnosed clinically and roentgenologically some of them being confirmed by surgery. Tables are given showing the results compared with those in normal individuals used as controls. He first determined acidity in the early morning before the patients had had anything

to eat. He then gave parenteral injections of histamine and made further determinations fifteen to thirty minutes after the injections. He also examined the stomach contents physically and microscopically

He found that compared with normal individuals both hydrochloric acid and total acidity were increased in the patients with duodenal ulcer. The hyperacidity was more marked after the histamine test than before. Physical examination showed an increase in the amount of gastric juice in all cases and the presence of very finely divided food residues. Microscopic examination revealed blood duodenal cells undergoing degeneration and jaworski's bodies

AUDREY G MORGAN M D

Basile A Fibroma of the Stomach (I fibroma dell stom c) *Ann ital d chir* 1941 20 79

The author reviews and summarizes the 64 reported cases of benign tumors of the stomach. Of the 30 patients of whom the sex was indicated 19 were male. The decades most frequently affected were the fifth and sixth although it has been suggested that the lesions may have existed long before discovery. The etiology is unknown in a congenital origin has been suspected in several instances in others an associated gastric ulcer cholecystitis or cholelithiasis trauma or chronic inflammation. The lesion is found to exist in two forms the submucous which springs from the mucous membrane and impinges upon the lumen of the stomach and the subserous form which takes its origin from similar tissue below the serous layer and develops at the expense of the surrounding structures. Of the group of such tumors known to the author 17 were of the first type and 5 of the second. No characteristic site of development has been noted although Basile found it to occur with greater frequency near the pylorus than near the cardia. The tumors may be sessile but show a well defined tendency to become pedunculated. The volume may vary from that of a pea to that of a man's head and the surface is ordinarily smooth and glistening and of a white color which somewhat resembles cartilage. If the lesion is of the submucous type the surface not infrequently presents ulcerations which may be a single or multiple and of varying depth. Though stenosis is apt to be hard and fibrous although degenerative processes may intervene to render it harder by calcareous infiltration or cyst formation. If subserous the lesion may be complicated by adhesions if submucous it may give rise to a diverticulum by traction on the duodenum or rise to a diverticulum in the gastric wall into the duodenum. Because of the characteristic picture is associated pathology the symptomatic picture is varied and non specific. Often signs and symptoms are entirely lacking and the tumor is discovered by chance at laparotomy. If the lesion is subserous it may be absent while the signs are those of an abdominal tumor. The more frequent sub-

mucous form, however, is usually accompanied by abundant subjective manifestations which may be suggestive of an ulcer—pyrosis, acid eructations, sense of epigastric weight, vomiting, diarrhea, nausea, and in some cases a selective anorexia to meat. Pain may be slight or knifelike, with radiation to the back. It may occur soon or late after eating, or it may show no relationship to food intake. The symptoms may be markedly aggravated by the occurrence of complications, chief among which is hemorrhage of varying intensity, associated with hematemesis or melena and a more or less profound anemia. The syndrome of mechanical obstruction may resemble either pyloric stenosis or intermittent occlusion of the pyloric orifice. Invagination of the gastric wall into the duodenum is a rare complication and shows itself as an acute occlusion. The general condition of the patient may indicate poor nutrition. Objective findings may include a relative diminution of gastric acidity, or the presence of lactic acid or of blood. Roentgenological examination may reveal a filling defect with smooth margins, not accompanied by infiltration as evidenced by the uninterrupted passage of the peristaltic waves over the involved area.

The differential diagnosis of gastric fibroma is principally concerned with peptic ulcer, gastritis, and carcinoma. The prognosis is governed by the gravity of the complications which may arise. The treatment is surgical and consists of excision of the tumor with the involved portion of the stomach wall.

A case report is added in which a fibroma was associated with an ulcer and was discovered at operation, clinical and roentgenological examinations having failed to reveal it.

EDITH FARNSWORTH, M D

Millett, M. Post-Traumatic Subcutaneous Intestinal Prolapse (Il prolasso intestinale sottocutaneo post-traumatico). *Arch ital di chir*, 1940, 58, 503.

In 1906 Waldeyer first used the term, "subcutaneous prolapse" to describe eversion after laparotomy. The author found 48 such cases reported in the literature and adds 1 of his own observed at the surgical clinic of the University of Bologna. His patient was a sixty-two-year-old man who had received a blow in the middle of the right rectus muscle. A bruised swelling which became larger on coughing presented itself. At operation under local anesthesia the rectus fibers were found to be torn, as well as the peritoneum through which protruded the hepatic flexure of the colon. This was replaced within the abdomen and the wound closed anatomically.

The author briefly summarizes the 48 cases he found in the literature. He found that 25 of them were associated with visceral lesions. In 20 per cent there was internal hemorrhage, which was fatal in 3 cases (6.12 per cent). In 2 cases (4.08 per cent) there was incarceration of the prolapsed loop of intestine. The total mortality was 26.53 per cent.

The usual traumatic cause is a blow by some blunt object over a circumscribed area of the abdomen. The most serious complications resulting from this condition are incarceration of the prolapsed tissue, perforation of a hollow viscus, and internal hemorrhage. It is necessary, therefore, to operate early and explore very thoroughly. The artery most often involved in cases with hemorrhage is the epigastric. The differentiation between prolapse and hernia is difficult without surgical intervention. The treatment is essentially surgical. JACOB E. KLEIN, M D

Tempesta, F. Chloremia and the Length of Survival after the Experimental Occlusion of the Intestine (Chloremia e sopravvivenza alle occlusioni intestinali sperimentali). *Arch ital di chir*, 1940, 19, 377.

The mechanism of death in intestinal occlusion is not as yet completely understood. A great deal of importance has been attributed to hypochloremia, as it precedes all the other humoral changes.

With a view to studying this question the author performed 5 series of experiments on rabbits, the protocols of which are given. In the first group occlusion was brought about and no treatment given before or after. In the second group 2 cc of a 20 per cent solution of sodium chloride was given before operation, and in the third group a 10 per cent solution of hydrochloric acid. In the fourth and fifth groups the same solutions of sodium chloride and hydrochloric acid were given after operation.

From a study of the results the author could not find any constant relationship between the amount of chloremia and the length of survival of the animals. Some of the animals given hypertonic salt solution died in a condition of slight hyperchloremia. In all cases animals with low occlusion survived longer than those with high occlusion. All of the treated animals survived longer than the controls. The liquid accumulated in the stomach and the loops of intestine above the occlusion contained considerable amounts of sodium chloride.

Death in intestinal occlusion is probably brought about by toxins of intestinal origin. As sodium chloride is mobilized and accumulates at the site of the occlusion it probably has a detoxicating action. Moreover, the water and sodium chloride aid in the elimination of the toxins. The hypochloremia is probably a manifestation of the struggle of the body against the intoxication. AUDREY G. MORGAN, M D

Cave, H W, and Thompson, J E. Mortality Factors in the Surgical Treatment of Ulcerative Colitis. *Ann Surg*, 1947, 114, 46.

Before mortality rates in ulcerative colitis will be lowered, the cyclic nature of the disease must be fully understood. There are usually four stages: (1) acute activity, (2) convalescence, (3) quiescence, and (4) early recurrence. The principal indirect mortality factor is that surgery comes too late. The two most important direct mortality factors are hemorrhage and peritonitis.

Ileostomy performed early after massive hemorrhage has proved for the most part unsuccessful. For this reason the authors have decided that profuse hemorrhage is no longer an indication for surgery. They recommend the administration of Vitamin K, if the prothrombin is low, and of Vitamin C and transfusions. The spasm which predisposes to hemorrhage is relaxed with belladonna and papaverine.

In 90 surgical procedures performed in 50 patients with ulcerative colitis there was a gross mortality of 2 per cent. Ileostomy, though not a difficult or formidable procedure, is attended with a considerable mortality. 8 of the 11 deaths in the reported series followed ileostomy. Of 34 ileostomies performed, 22 were elective and 12 were emergencies. There was a 50 per cent mortality in the emergency group. Half of the patients in this group had perforations before operation and died from the effects of pre-existing peritonitis.

Nine of the 11 fatalities in the authors' series were due to peritonitis. Four were due to technical errors: embolization of the circulation in a loop of ileum brought outside of the abdominal wall, dropping back what was thought to be a healthy divided stump of the distal segment of the colon, and soiling while multiple intra-abdominal fistulas were divided at the time of colectomy. In order to obviate peritonitis, it is recommended that the distal divided end of small or large bowel be brought to the abdominal wall to remain as a mucous fistula. The intraperitoneal implantation of crystalline sulfanilamide at operation is also recommended.

The mortality can also be diminished by the proper choice of patients and adequate pre-operative measures. Thus surgery is justified in chronically ill patients (1) when there is a progressive and continuous extension of the pathological changes, and (2) when they continue to have characteristic periods of recurrence and remission accompanied by extensive involvement of the colon. Impending perforation is unquestionably an indication for surgery.

The correct use of abnormal conditions before surgery is undertaken is imperative in chronically ill patients. The test-diet method should be employed when indicated to rule out an active food allergy. Gastric anacidity should be treated to reduce diarrhea and flatulence. Functional disturbances in proteins and vitamins should be corrected. Anemia should be combated. Disturbances in mineral metabolism should be prevented. Malnutrition and inanition should be prevented.

Spinal anesthesia is recommended. When the disease involves the entire colon a three-stage operation has proved almost ileostomy, subtotal colectomy and proctectomy. When the cecum, ascending colon and transverse colon are involved, an ileogastrostomy (end to side) is recommended with the distal divided end of the ileum brought out as a mucous fistula. When only the rectum and descending colon are involved, transect the colon with the removal of the descending colon, spere

formed at the first stage and removal of the rectum at the second stage.

Low residue feedings are begun the afternoon of the operative day. This has proved helpful in causing the ileostomy to function earlier by reducing postoperative gaseous distention and by maintaining adequate nutrition.

In discussing the report H. B. Stone stated that in his experience sulfanilamide has no value as a curative agent in the treatment of the basic disease.

H. B. Stone, M.D.

Schulze A. Non Specific Inflammatory Tumors of the Large Intestine and Their Differential Diagnosis from Carcinoma (Ueber unpezifische Entzündungen des Dickdarms). *Monatsschrift für Chirurgie*, 1934, 62, 1-10.

The author presents the analysis of 4 Tietze cases of intestinal tumors seen from 1889 to 1918 in addition to 4 case histories from the Hohlbaum Clinic, 3 of which were on inflammatory tumors and 1 on abscess due to cancer which had been mistaken for an inflammatory tumor.

A thirty-nine year-old man in May 1913 received attacks of pain in the left hypogastric region. Then after three years of good health he suddenly suffered again with intense pain and intestinal obstruction. At operation a me enteric abscess 5 cm wide was exposed with a wide hard inflammatory mass in the sigmoid. This was resected and an end-to-side anastomosis made. The parietal peritoneum on both sides of the anastomosis was fixed deep to the mesentery so that the anastomosis was extra-peritoneal. A cecal fistula formed the next day but after this there was a smooth recovery. The ratons showed a thickened gut wall in one portion of which the me enteric abscess had originated. The mucous membrane throughout was intact.

A thirty-seven year-old man had suffered hard cramp-like pains and rectal bleeding margins in February 1937. These subsided spontaneously but recurred after two months. This time there was a painful reddened swelling in the left lumbar region. He was operated on with a diagnosis of perinephritic abscess. Odorless blood-stained pus was drained. Three days afterward a fecal fistula developed. The x-ray study showed a contrast enema led to a diagnosis of sigmoid tumor of the cecum of the descending colon. There were no characteristic findings for malignant tumor as the mucous membrane of the narrowed portion showed little change. In a second operation a side-to-side anastomosis between the transverse and sigmoid colon was made. Healing occurred. An x-ray study eight months later showed a smooth contour between the transverse and descending colon and the lumen was normal.

A fifty-seven year-old man had suffered paroxysmal attacks of pain in the left hypogastrium for ten years. Within three to four months these had subsided completely. In 1934 the pain recurred

The patient suffered distress and the stool always contained macroscopic blood. The x-ray diagnosis was an inflammatory stenosing tumor of the sigmoid colon. At operation, hard, firm adhesions between the small and large intestines were found. Two abscesses containing the bacillus coli were encountered. The stenosed portion of the sigmoid was resected and an end-to-side anastomosis was made, extraperitoneally. Healing was uneventful. Five years later the patient was entirely symptom-free. Preparations showed a narrowed portion of intestine 7 cm long, the walls of which were thickened in places, while the mucous membrane was intact.

4 The patient, a forty-four-year-old man, first noticed in January, 1937, that he had lost 15 lb in a short time, and from time to time had a sense of pressure in the hypogastrium. Occult blood occurred in the stool. In November, 1937, the symptoms grew worse. He had a fever of 39 degrees. The diagnosis was peritonitis, secondary to an inflammatory tumor of the large bowel. Operation showed numerous inflammatory adhesions between the large and small intestines. A deep abscess containing the bacillus coli was encountered at the level of the promontorium, it was opened and drained. In the post-operative course, a fecal fistula formed. X-ray examination showed a narrowing to the thickness of a lead pencil above the rectal ampulla which was about 5 cm long. At this place, the mucous membrane was ragged, fringed, and roughened. The diagnosis was cancer. The patient was operated upon again with resection of the tumor, and the end-to-side anastomosis was extra-peritonealized by approximation of the parietal peritoneum and mesentery. For a while there was smooth progress, then right-sided empyema. A rib resection was then done and the bacillus coli was found in the pus. The patient died three weeks later. The microscopic diagnosis was adenocarcinoma.

The author has searched the literature from 1925 on and collected 100 further interesting cases. They show the difficulty of differential diagnosis. Abdominal and peritoneal abscesses seldom occur with carcinoma. The inflammatory tumors occur most frequently between the ages of forty and sixty years. Men are twice as frequently affected. One instance was found in a child of five years. In most cases, the patient with an inflammatory tumor has more chronic pain, with intervals entirely free from trouble. Difficulty in passing urine is not infrequent. Eisenberg attributes 8 cases in a series of 58 patients to rupture of a diverticulum of the bladder. Objectively, an increased sedimentation rate is indicative. Also, not infrequently macroscopic as well as occult blood is found in the stool. In 100 cases, occult blood was found 4 times and macroscopic blood 9 times. The x-ray study is important. It shows that the mucous membrane is intact. The variability of the x-ray findings speaks further in favor of inflammatory tumor. Also, one finds peritoneal irritation earlier with inflammatory tumors. Both palliative and radical operative methods have had good re-

sults, and both one-stage and two-stage operations are done. Often an artificial anus is of value. Errors of diagnosis will always be possible, for cancer in some circumstances has an inflammatory character. Both kinds of tumors appear to have a predilection for the ascending colon.

(FRANZ) MARIAN BARNES, M D

Burge, R. E. Carcinoma of the Large Intestine, Review of 416 Autopsy Records. *Arch Surg*, 1941, 42: 801.

All of the patients reported on in this review came to autopsy in the department of pathology at the University of Minnesota between January, 1910, and July, 1937, because of carcinoma of the large bowel. Four hundred and sixteen records of carcinoma of the large intestine and of the rectal canal were collected from 26,798 autopsy records.

The author arrives at the following conclusions.

The relation of age, sex, and site in this series of malignant lesions of the large intestine apparently presents no evidence of geographic influence when compared to the experience generally encountered in other sections of the country.

The early clinical pattern of malignant disease of the colon presents no specific symptoms. It is not until hemorrhage or interference with function appears that the patient seeks medical advice. Therefore, melena, change in intestinal habit, weakness, anemia, loss of weight or signs of colonic obstruction, whenever present and in whatever combination, should be thoroughly investigated to rule out the presence of carcinoma of the large intestine before the patient's complaint is treated symptomatically.

Reliable clinical proof of early colonic cancer depends on the roentgen rays. Digital examination of the rectum and the use of the sigmoidoscope are important for recognition of neoplastic lesions of the distal segments of the colon.

JOSEPH K. NARAT, M D

Coller, F. A., Kay, E. B., and MacIntyre, R. S. Regional Lymphatic Metastases of Carcinoma of the Colon. *Ann Surg*, 1941, 114: 56.

This study is based upon the dissection and examination of the lymph nodes in 46 specimens of carcinoma of the colon, by David and Gilchrist's modification of the method of Spalteholz. Microscopic examination of the lymph nodes was done and the results charted on diagrams. An average of 52 nodes were isolated per specimen.

Regional lymph-node metastasis is only one factor in determining the operability and prognosis of carcinoma of the large intestine. Inoperability or a poor prognosis may result from extensive local infiltration, hematogenous metastasis, or peritoneal implantation. Ten per cent of the neoplasms showed microscopic evidence of infiltration into the blood vessels. Local infiltration was evidenced in 93.1 per cent of specimens in which there was complete infiltration through the bowel wall. This is a constant source of free peritoneal implantation.

disposed the liver to cirrhosis. Although his symptoms were referable to the tumor from the beginning his intense and progressive icterus without disturbances of the intrahepatic biliary system, his marked urobilinuria and his signs of decided liver insufficiency occurring shortly after the intervention and progressing gradually toward terminal coma denoted a diffuse anatomofunctional change in the liver such as that found in cirrhosis. In addition his histological examination showed that the liver parenchyma at a distance from the tumor was changed into fibrous connective tissue containing remnants of hepatic trabeculae and occasional biliary canaliculi contracted and deformed by the connective tissue around the tumor. The connective tissue had a hyaline loose aspect as if it had undergone the regressive influence of the tumor. Therefore it is thought that the chronic interstitial lesions had preceded the appearance of the tumor.

RICHARD KEMP, M.D.

Doran W. T., Lewis K. M., Hanssen F. C., Spler L. C. B. and Doran W. T. Jr. Gall Bladder Surgery. A Ten Years' Statistical Review. Including 410 Operated Cases. *Am. J. Surg.* 1941; 53: 41.

The authors present a ten-year survey of 410 operations for gall bladder disease done at the Bellevue Hospital in New York. Cholecystography, biliary drainage and blood chemistry were done in the diagnostic work up.

An analysis of the cholecystograms revealed that when no visualization of the gall bladder delayed emptying or shadows of calculi were reported the findings were confirmed at operation in 84 per cent of the cases while if cases showed normal visualization and normal emptying time of the gall bladder without shadows of calculi the x-ray findings were confirmed in only 50 per cent of the cases examined. Thus the greatest margin of error lay in those cases which appeared normal in the roentgenograms.

Biliary drainage was done with the aid of the T-tube and the horizontal T-tube sump tube and is regarded as a necessary and important diagnostic procedure. The presence or absence of concentrated bile in the pre-operative drainage bears no direct relationship to the presence or absence of calculi found at the time of operation. The presence of concentrated bile denoting only patency of the cystic duct and the ability of the gall bladder to concentrate bile.

In 4 per cent of 209 cases which were operated on and in which biliary drainage was done cholesterol crystals were present, calcium bilirubinate was present in 6 per cent and both were present in 17 per cent. When cholesterol crystals were present stones were found at operation in 92 per cent and the presence of calcium bilirubinate in bile was associated with stones in 80 per cent. These findings indicate that when cholesterol crystals or bilirubin calcium pigment is found in bile obtained by duodenal drainage prior to operation there is a strong

probability that stones are present. However, the absence is not a reliable indicator of the absence of stones.

Non-surgical biliary drainage was also utilized postoperatively as a means of determining the function of the junction of Oddi and as an aid in its management. Dietary regulation, general hygienic measures and the judicious use of sedatives and antispasmodics were also valuable adjuncts in reducing the postoperative morbidity.

Further diagnostic measures included the icterus index, blood cholesterol, blood sugar and non-protein nitrogen determinations, the bleeding time and clotting time, the Van den Bergh test, determination of bile in the urine, the blood Wassermann test, urinalysis and complete blood count. At operation cultures were made of the gall bladder wall and the gall bladder bile whenever possible. Cultures of the gall bladder wall were positive in 55 per cent and of the gall bladder bile in 51 per cent of the cases, the most frequent organisms being the bacillus coli, staphylococcus aureus and streptococcus viridans.

T-tubes were inserted whenever the common duct was opened and cholangiograms were taken whenever indicated to determine the presence of any calculi overlooked in the common duct. Jaundiced patients with prolonged clotting time received vitamin K and bile salts supplemented by blood transfusions. Catgut was routinely used for sutures and ligatures although silk and cotton thread were employed on occasion.

There were 17 cases of chronic cholecystitis with stones all of which were treated by cholecystectomy. There were 26 cases of chronic cholecystitis without stones, cholecystectomy was performed in every case and with choledochotomy in 3. Thirty-three patients had acute cholecystitis with stones, cholecystectomy was performed in 26 of them and cholecystostomy in 7. Ten patients had acute cholecystitis without stones, cholecystectomy was done in 4 of these and cholecystostomy in 6. There were 14 patients with stones in the common duct, cholecystectomy was done in 8, cholecystostomy in 2 and choledochostomy in all 14.

Complications occurred in 93 of the series of 410 operative cases. The most frequent complication was no infection which occurred in 34 or 8 per cent. Pneumonia occurred in 11 cases, cardiac decompensation in 8 cases and postoperative shock in 5 cases.

Of the 410 patients operated upon 6 died, a mortality rate of 6.3 per cent. Among the causes of death were postoperative pneumonia, cerebral pulmonary embolus, cardiac decompensation, massive collapse of the lung and peritonitis.

Among cases followed up there was a symptomatic cure in 84 per cent of the cases of acute cholecystitis, 90 per cent of the cases of chronic cholecystitis with stones and 41 per cent of the cases of chronic cholecystitis without stones. Among the cases of common duct stones the follow-up study

showed no recurrence of pain or jaundice in 60 per cent
S LLOYD TETTELMAN, M D

River, L, McNealy, R W, and Ragins, A B Carcinoma of the Ampulla of Vater, 3 Cases of Transduodenal Resection *Am J Surg*, 1941, 52 289

Complete work-up should be started on the jaundiced patient as soon as the history is written, and the administration of Vitamin K, bile salts, increased glucose, and blood, (as available), should begin at the same time. Roentgenography, at present, offers little diagnostic help.

If obstructive jaundice is demonstrated, particularly in the absence of pancreatic ferments in the duodenal contents and the presence of blood in the stools, surgical exploration should wait only upon adequate preparation of the patient.

In addition to the usual exploration of the gall bladder and ducts, and palpation of the duodenum and pancreas, the duodenum should be mobilized and palpated, or opened, or both.

For the small, early tumors one-stage local resection seems still to be the procedure of choice. The pancreatic duct may be ligated if necessary. If the size of the growth and the extent of invasion of the duodenum and pancreas indicate the futility of attempting one-stage local resection, the first stage of Whipple's operation should be done. Excellent palliation with little danger of ascending cholangitis may be expected from the cholecystojejunostomy. Longitudinal anterior duodenotomy with transverse closure is suggested as compensation for the posterior resection.

Three instances of successful transduodenal resection of perampullary carcinoma with re-implantation of the ducts are recorded. Two required subsequent internal biliary drainage because of stenosis at the anastomoses.

JOSEPH K. NARAT, M D

Popper, H L, and Plotke, F Studies on Pancreatitis *Surgery*, 1941, 9 706

The authors commend the value of blood amylase determinations in acute pancreatic diseases, as well as the value of the determination of the blood lipase. However, the presence of increase in the concentration of the amylase being of such short duration, from three to five days, definitely reduces the value of the procedure. In some of the clinical cases it was even noted that the blood amylase level diminished even before the third day of the disease. It is, as they say, an open question why this elevation persists only for a few days. In search for an answer to this question, the authors attempted a series of experiments in which intravenous injections of commercial trypsin were employed. The blood of dogs suffering from acute pancreatitis was infused into normal dogs, and acetyl-betamethyl-choline and eserine were injected. Repeated serum-amylase and serum-lipase determinations were carried out.

The experiments revealed that the body begins to eliminate an increased amount of blood amylase very

promptly, and this elimination is maintained only if there is a continued introduction of the ferment into the circulation. That a similar condition exists in human pancreatic disease is to be assumed. One can, therefore, conclude if the serum amylase in human pancreatitis decreases within the first three days of the disease, the pancreatic disease is resolving and less of the amylase is being discharged into the blood stream. On the other hand, if the blood level of the amylase does not descend until after the third to fifth day one must assume that the pancreas is so damaged that it is incapable of discharging more of the enzyme into the circulation.

WILLIAM C. BECK, M D

Walters, W, and Cleveland, W H Surgical Lesions of the Pancreas, A Review *Arch Surg*, 1941, 42 819

Surgical lesions of the pancreas are not rare. Two hundred and fifty-five operations upon the pancreas were performed at the Mayo Clinic in the five-year period ending 1939, or approximately 1 operation for every 25 performed on the gall bladder and bile ducts.

The most frequent surgical lesion of the pancreas is carcinoma. One hundred and eighty-five, or 73 per cent, of these operations in the five-year period were performed for carcinoma. When jaundice is present, some sort of operation that will short-circuit the bile, such as cholecystogastrostomy, is the best procedure. About 15 per cent of the lesions which appear to be malignant are, in reality, benign and inflammatory lesions.

Acute pancreatitis is rarely encountered, and when the diagnosis is definite, operative treatment is probably best deferred. Chronic pancreatitis is more common and usually is associated with disease of the biliary tract; it can be managed by correction or treatment of the biliary disease.

Pancreatic cyst, although not common, was treated surgically in 139 cases during 1939. Excision, partial excision, and drainage with or without marsupialization have given good results.

Pancreatic stones, when they are not merely calcifications of the parenchyma but real intraductal stones, should be removed to prevent pancreatic atrophy, diabetes, and fatty infiltration of the liver.

At the clinic the authors have observed 16 cases of hyperfunctioning tumor of the islands of Langerhans in which hypoglycemia was present. In 12 of the cases removal of the tumor was possible. Four of the tumors were inoperable carcinomas, and 4 of the 12 removed tumors were carcinomas. Eighteen patients with severe degrees of hypoglycemia have been subjected to exploratory laparotomy at the clinic, but no tumor was found. Tumors of the pancreas which produce hypoglycemia should be excised early on account of the danger of malignancy.

Ten cases of accessory pancreas have been observed since 1935. In 6 the accessory pancreas was removed because it was producing symptoms. In 4 the accessory pancreas was removed by excision and

as the other operative procedure. The accessory pancreas should be removed if it is the cause of symptoms.

Recent advances have been made in the diagnosis of pancreatic disease by virtue of the development of tests for serum amylase and lipase and the secretin test for stimulation of pancreatic secretion.

MISCELLANEOUS

Peterson, S. J. and Jensenius H.: *Experimental Studies on the Production of Pernicious Anemia by Operation on the Digestive Tract. Results of 3 Types of Combined Elective Resections of the Stomach and Duodenum on Dogs.* *Acta med Scand* 1941 107: 507.

An account is given of the writers' experimental studies previous and new on the results of three different types of elective combined resections of the stomach and duodenum performed on pups and adult dogs.

Operative elimination of the area estimated by clinicotherapeutic investigators to be the localization of the intrinsic factor (pylorus and the Brunner gland area in the duodenum) has not resulted in experimental pernicious anemia. Thus there is a conspicuous divergence between the view of the clini-

cians concerning the specific antiperchlorous anemic function of a pyloric gland organ and the results of parallel animal experiments concerning the same region.

The aforementioned operation on the other hand have constantly brought about the development of a pellagrous syndrome. In pups this appeared in (1) a gastropyloric form which was severe, fatal, acute or chronic and characterized by arrest of growth, emaciation, skin and hair changes, degeneration of the central nervous system and changes in the blood and bone marrow and (2) two pylorogastrotomy forms (a) an acute clinically atypical fatal form characterized by severe anemia and severe morphological changes in the central nervous system but more often (b) a chronic milder form with changes which corresponded essentially to those of (1) but showed additional particular phenomena: alopecia areata like loss of hair, pigmentation of the skin, achylia and a tendency toward remission.

In adult dogs there appeared only a chronic relatively mild subpellagrous condition—regardless of the type of operation to which the animal was submitted. A thorough account is given of the clinical and morphological features of all of these morbid changes.

S. MULLER, KILBY, MD

GYNECOLOGY

UTERUS

Genell, S. A Synopsis of a Physiological Investigation Regarding the Motor Function of the Uterus in the Non-Gravid Organism (Uebersicht ueber die physiologische Forschung betreffend die motorische Funktion des Uterus im nichtgravidem Organismus) *Ergebn d. Physiol.*, 1940, 43 371

In this article Genell summarizes our present day knowledge of the physiology of the uterus. He has made a detailed study of the literature and performed successful experimental laboratory work on this subject and therefore his estimation and summarization of the current reports on the physiology of the uterus are valuable. The study begins with 364 reports found in the literature from 1850 to 1939. This record is divided into 2 parts: the first is a summary of the methods of study employed, and the second is a tabulation of the results of the physiological researches.

Regarding the methods of study, the author mentions the older methods of William Harvey, Spiegelberg, Frommel, and Kurdinowski, as well as the newer methods, such as Magnus Kehler's experiments *in vitro*, Trendelenburg's technique *in vivo*, with modifications by Clark, Knaus, and Genell, Katsch-Borscher's fenestrated abdominal method, the Ballon method with its modifications, Schultze's hysterosalpingography, and Westman's laparoscopic attempts.

In the second part—the results of the physiological researches—the discussions pertain to the following: muscle physiology, nerve physiology, hormonal regulation, and finally the biological function of the uterine motility.

In the chapter on muscle physiology the mechanical, thermal, and chemical irritation of the uterus are discussed. Of the chemical irritations, the special influence of oxytocins upon the uterine musculature is described in detail, an influence which is characterized by an increase of frequency, of amplitude, and of tonus, and which is similar in its results to those obtained by Ludwig and Lentz (1924) in their experiments *in vitro* and *in vivo*. In this connection Genell's warning, not to mistake the condition of contraction for that of the tonus, or vice versa, is significant. Sun made an interesting experiment in 1925 and claimed that there were different reactions of pituitrin in different parts of the uterus: the lower segment of the uterus in human beings reacts with a great increase in tonus without any apparent volition. In this chapter the author discusses the significance of the "Ionenmilieu" and the hydrogen-ion-concentration.

The gist of the chapter on nerve-physiology is the description of the action of autonomic "pharmaca" upon the contraction relationships of the uterus. In this chapter Genell also emphasizes the still prev-

alent uncertainty as to the function of the parasympathetic nerve tract. Hasama's interesting attempts at registering the paths or courses of uterine activity are stated. According to Hasama, the tonus impulses of the uterus are produced by the sympathetic and the rhythmic contractions by the parasympathetic. The studies of Dyroff and Stefaniuk yielded similar results. Mahon (1939) claimed that the sympathetic is the nerve that controls the tonus of the corpus uteri, and that the parasympathetic is an accessory motor nerve of the uterus which is contracted intermittently.

The last and longest chapter concerns the hormonal regulation of uterine motility. The uterine motility depends upon the sex cycle variations. In animals having normal sex cycles and spontaneous ovulations the contractions are not so frequent during estrus, however, during the diestrus the rhythm is increased and the power diminished. In human beings these conditions are different. Knaus (1930) is of the opinion that during the corpus-luteum phase the spontaneous activity is disturbed or entirely suspended. Kraul (1935) states that the activity during the postmenstrual period is more marked than in the premenstrual period. Moir (1933) found spontaneous activity in the non-pregnant uterus during all of its phases, in the first half of the interval the contractions were small, frequent, and regular, and after the sixteenth day they became stronger but lost their regularity. All of these various theories are sponsored by different observers.

It is Genell's opinion that in the rat, under the influence of the sex hormones, the different types of uterine motility during the course of the sex cycle are caused solely by the estrin, and that the corpora lutea of ovulation do not have any endocrine influence upon this motility. This theory is backed by castration and substitution attempts. The relation of the sex hormones to the tonus of the uterine musculature is interpreted differently by the various investigators. According to researches made on women by Wilson and Kurzrok in 1938, the tonus during the follicle phase is greater than that during the corpus-luteum phase. For these examinations these authors used the Ballon method. Kumagi, using the same method in examining dogs, claims to have established the opposite results. Genell's own investigations of rats *in vivo*, as well as *in vitro*, yielded results that showed that the tonus varied with the sex phases: during the heat phase the tonus was lower than in the non-heat phase. The diminishing tonus in the heat phase was conditioned by the folliculin. Castration attempts also proved that the uterus was kept at a certain tonus by non-hormonal factors. The cervical musculature maintains a different tonus than does the corpus musculature. Genell found, also in the rat, that the cervical canal is narrower during heat than at other times.

If the roentgen therapy precedes the radium it is not necessary to give the radium in divided doses except in cancer of the body of a very large uterus. Equally good results have been obtained after both methods. Radium should be given in both the uterine and cervical canals in dosages just a little short of saturation of the surrounding tissues. As large a total ration of the surrounding tissues as possible should be given if the vagina is tolerably healthy. The dose of radium can safely be tolerated by means of the application to the vault of the vagina by means of the applicator or by interstitial irradiation in the form of colpostat or by interstitial irradiation in the form of selected cases.

The author's method is as follows:

- (1) Give a full course of x-rays or a week after roentgen irradiation.
- (2) Apply radium to the vault of the vagina by means of the intrauterine applicator or by interstitial irradiation in the form of colpostat or by interstitial irradiation in the form of selected cases.

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ADNEXAL AND PERITONEAL DEFECTS

Marjola O A Adnexal Defects 94 21 29
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Although a unilateral defect of the adnexa is as most the rule in some low animals it is rarely found in man. Rokitan's pack of torsion of the construction of the adnexa as the cause of the adnexal add r tngul t n a f c t r Torsion of the adnexa can occur only when the l t t r re freely movable and the cauat e fa t r s nclud (1) a phys calfc t r (other than t h greal t t h log cal factor) adn xa (2) a phys t r adn xal tumors and (3) a uch a long tube r adn xal force such as n t al p r pulv r r dr ing f rce of the bladder prg stals s emy tng and filling of the bladder r tation m e n n a y act trauma and pasive trauma (fallng ments of the trunk) and pasive trauma (fallng and b manual exam nat on). It h s b e con d r d as whether the adnexal defects sh uld be con d r d as pr mary developm ntal d strubances (aplas as) or

Ratzenhofer M Anglioma of the Uterus as an Unusual Cause of Menorrhagia (A German Contribution to the Pathology of the Uterus) 874

hemorrhage were unsuccessful. A hysterectomy was performed only a temporary effect. A hysterectomy was done by another curettage and when the uterus was treated by another hysterectomy was done successful vaginal hysterectomy and microscopic examination of the uterus demonstrated that the uterus was negative as to any changes but the microscopic examination of the enlarged uterus demonstrated the presence of numerous thin walled vessels in the internal layers of the other is normal myometrium. The capillary system as well as the afferent and efferent vessels was normal. The term angiosarcoma of the uterus was used to describe the changes. A search of the literature revealed no similar case but there was a certain similarity to the angiosarcoma described by Falk and Walther. Apparently there was a congenital basis for these changes as the occurrence of frequent nosebleeds, telangiectasia and the presence of a generalized involvement of the vascular apparatus in this woman. Hereditary factors as indicated a disease are probable. At any rate the condition was a rare disturbance of the vessel of the uterus which was the morphological basis for the repeated metrorrhagia.

Newcomer E. Comm
Sequel of Carcinoma of the
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This article contains number u of ni ns r gard ng
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as conditions developing during the fetal period or during later life. Neither has been definitely proved.

Regarding the cause of the torsion of normal adnexa two theories prevail today, the so-called hemodynamic theory of Payr, and the rotation theory of Sellheim. According to the former, a rise in the pressure within the ovarian and tubal veins causes the latter to wind corkscrew-like around the artery and thus produce torsion of the adnexa. Sellheim claims that this force is insufficient to produce torsion, that a stronger force is necessary, such as the rotation movements of the trunk, especially around the transverse axis.

Pathologically, Kermauner classifies the adnexal defects into 5 groups: (1) the tube, ovary, broad ligament, uterine cornu, as well as the kidney and ureter of the same side are missing, (2) the uterus is of normal form, but there is only a median stump of the tube from 0.5 to 1.5 cm long, (3) the ovary is missing and the middle portion of the tube is canalized, but thins out laterally into a solid band, (4) the same condition exists as in the previous group, but the tube is of normal length, is coiled up, and gradually becomes thinner and ends in a knob, with an isolated mesosalpinx, (5) the ovary is missing, but everything else is normal.

Only the first group of cases fulfill the demands of a primary aplasia. The other four forms are produced by secondary causes, such as torsions and constrictions. Twisted or constricted adnexa may be completely resorbed, and the peritoneum is then of a peculiarly glistening smoothness even at the site of rupture, but it is entirely free of cicatrices and mobile. After puberty the tunica albuginea of the ovary is hardened to such an extent that complete resorption of the ovary is prevented. In these cases the ovary becomes a necrotic mass of tissue, and there is a calcified mass in the connective-tissue capsule, which may lie in the pouch of Douglas or elsewhere in the abdominal cavity, even adherent to the peritoneum.

The author discusses the 34 cases reported in the literature since 1894 and adds 5 cases of adnexal defect of his own. In 3 of the latter a tube and ovary were missing and in 2 others the tube was missing. The patients had never been operated upon before. On the basis of the cases reported from the literature and his own cases, the author shows that the defects occur on both sides with equal frequency. Judging from the literature, most of the defects should be primary and originate from developmental disturbances. According to the author, however, such aplasias are extremely rare, and he states that in this type the absence of the derivatives of the homolateral wolffian duct, the kidney and the ureter, is demanded. In the remaining cases the defect originated secondarily and was produced either by strangulation or torsion during intra-uterine or extra-uterine life. The most common form of defect is the simultaneous absence of tube and ovary, but the ovary or tube alone may be missing.

LOUIS NEUWELT, M.D.

MISCELLANEOUS

Leventhal, M. L., and Solomon, E. M. The Therapeutic Value of Tubal Patency Tests in Sterility and Infertility. *Am J Obst & Gynec*, 1941, 41: 628

The effect produced by insufflation which makes possible ensuing pregnancy may be explained almost entirely on a mechanical basis. The restoration of partial or complete patency in diseased tubes has been repeatedly demonstrated. Obstructions such as inspissated mucus within the tubal lumen may be expelled, a tortuous tube may be straightened and adhesions may be broken down. The value of perturbation in curing sterility is especially demonstrated in patients in which some associated pathological process causes interference with tubal function.

Observations are recorded based on the investigation of the tubal patency test as a therapeutic measure in sterility. In a series of 133 patients in whom the patency test could be evaluated, 54, or 40.6 per cent, became gravid. Of 114, or 85.7 per cent, of the patients in whom patency in one or both tubes was demonstrated, 51, or 45 per cent, conceived. Of 19, or 14.3 per cent, of the patients in whom no patency was demonstrated to gas or oil, 3, or 15.8 per cent, conceived. Twenty-eight, or 21.5 per cent, of the patients became pregnant within two months of the test, the pregnancy being attributable directly to the procedure. Coitus immediately preceding insufflation probably added to the high percentage of successes and was attended by no ill effects.

An analysis of the pathological conditions which contribute to tubal obstruction is presented. The cure of sterility in tubal obstruction is accomplished by a re-establishment of tubal function and patency due to the mechanical effects of perturbation. The relative merits of insufflation and lipiodol instillation as therapeutic agents are considered. Lipiodol instillation is superior to gas insufflation both from a diagnostic and therapeutic standpoint.

EDWARD L. CORNELL, M.D.

Albright, F., Smith, P. H., and Richardson, A. M. Postmenopausal Osteoporosis, Clinical Features. *J Am M Ass*, 1941, 116: 2465

Adult bone is continuously undergoing new formation and resorption. Consequently, the total amount of bone may be less than normal either because there is accelerated resorption, as is true in hyperparathyroidism, or because there is inadequate formation of new bone. Too little bone may be formed either because osteoblasts fail to lay down sufficient osseous matrix, as is true in osteoporosis or because the matrix is not calcified, as in osteomalacia and rickets.

It seems probable that osteoblasts produce the enzyme phosphatase. Consequently, the serum-phosphatase level can be considered an index of osteoblastic activity, there is no increase with

INTERNATIONAL ABSTRACT OF SURGERY

osteoporosis. Since osteoporosis is not a disease which involves the calcium metabolism the serum calcium and phosphorus levels remain at normal values.

Many factors may be responsible for osteoporosis viz. disuse, dietary deficiencies, gastric hypochlorhydria, repeated pregnancies, thyrotoxicosis, senescence, and Cushing's disease. The atrophy of disuse is well recognized and is probably responsible for much of the generalized osteoporosis seen in older persons. There is no unanimity of opinion about the role played by diet in the production of osteoporosis. However, the authors admit that an increased availability of calcium and phosphorus tends to curtail bone resorption. Repeated pregnancies tend to drain the body supply of calcium and consequently are an important predisposing factor to osteomalacia but they probably are of no import in the causation of osteoporosis. With longstanding thyrotoxicosis there is an increased excretion of calcium in the urine and feces; this condition may predispose to osteoporosis.

Like the skin, hair and elastic tissue the bones atrophy in old age; consequently fractures of the femur are common in senescence. Senile osteoporosis is designated as such in the literature. Consequently all patients over sixty years of age have been excluded from this study of postmenopausal osteoporosis.

There is included a detailed analysis of 42 cases of generalized osteoporosis without obvious cause. By the term "generalized" the authors mean that the process was not restricted to one vertebra or one extremity although all of the bones were necessarily involved. Forty of the 42 patients were women all of whom had passed the menopause. The average time of onset of the symptoms was nine and one-half years after a physiological menopause and thirteen and two-fifths years after an artificial menopause.

Postmenopausal osteoporosis has a predilection for the spine and pelvis; the long bones are involved only in severe cases and the skull is usually not affected. The common clinical syndrome results from a vertebral lesion and a characteristic history is as follows:

A woman who is about ten years past the menopause receives a minor joint strain or a pain in the back and a roentgen examination of the spine reveals osteoporosis with a crushed or fractured vertebra, a fish vertebra or herniation of the nucleus pulposus through the end plates. Urinary calculi are not uncommon probably because there is increased excretion of calcium in the urine during the early stage of osteoporosis. Furthermore, these patients are likely to show their age prematurely and their skin is quite thin all of this suggests that the atrophy is widespread and is not restricted to the bone matrix.

The results from treatment with estrogens and other agents will be published later.

GEORGE H. GARDNER, M.D.

Michailowsky B. Scientific and Rechiné
M. Secondary Lesions of the Urinary Bladder
in Cancer of the Genital Tract in Women
(S. Kund. L. Kra. Lung. n. d. r. H. rmb. se. b. m.
G. nit. Kreb. der Frau.) Akt. I. G. 194. 25

While the encroachment of cancer of the genital tract in women upon the urinary bladder by direct extension is quite frequent, cancer metastasis of the bladder wall is seldom encountered. The phase of the primary growth plays no role in the metastatic picture. Metastases are found in the wall of the bladder in cases of fully operable cervical cancer. The involvement of the bladder by extension of the tumor is more frequent if the primary site of the tumor is the anterior lip or wall of the cervical canal. When the primary site is in the posterior wall, the involvement of the bladder will rarely be found. The clinical symptoms of secondary cancer of the bladder are few and uncertain.

The only certain method of diagnosis is cystoscopy. The authors differentiate the following types:
1. The mucous membrane with widened vessels and uneven and thickened portions which results from pressure of the tumor on the posterior wall of the bladder.

2. The mucous membrane with gross thickening and transverse folds which reach from the sphincter to the middle of the bladder. Often a trabeculated bladder results.

3. A cushion-like anterior convexity of the bladder which finally occurs.
4. Necrosis and a superimposed fibrinopurulent diffuse cystitis of the bladder.

This finding of cystoscopy is impossible because of the reduced capacity of the bladder.
There is not a strong parallel between cases of cervical cancer and cases of cancer of the bladder. One can find disturbances in voiding early in cases of cervical cancer but in cases of further advanced cervical cancer they may be absent.

The author has compiled two tables of statistical data on 42 non-operable cases and 34 operable cases of cervical cancer and their bladder distal branches. The operability and healing of cervical cancer depend essentially upon involvement of the bladder. The most certain aid in their diagnosis is cystoscopy.
(R. GUTZLER) MARIAN BARNES, M.D.

Strauss H. and McGoldrick J. L. Fracture of the Femoral Neck. L. Foll. wing Roentgen Th. rapy f. r. Gyn. cological. Malignancy. Am. J. Obs. & Gyn. 94. 4. 95.

Four cases of fracture of the femoral neck following radiation therapy of carcinoma of the cervix are presented. Repeated roentgenograms were negative for metastases particularly at the sites of fracture. Many roentgenograms disclosed no osteofibrosis nor any destructive neuropathic or other recognizable bone disease. It is generally concluded that syphilis is not an etiologic factor in this condition. The incidence of fracture of the femoral neck in cases of gynecological carcinoma treated by

roentgen therapy is higher than that observed in a similar age group of the population

Senescence certainly could not be an important factor in the first patient, who was only thirty-eight years old at the time of death. Obesity can be ruled out as a cause, since the patients at most weighed between 96 and 140 lb during the period of treatment.

Severe trauma is entirely excluded because the first patient was bedridden except for the necessary examinations, and the others gave no such history. At no time did they complain of sudden sharp pain. The fracture was insidious and was diagnosed fortuitously in the first case during roentgenographic examination of the colon with barium. Only one and one-half months previously the femur and pelvis were roentgenographically negative. Absence of bilaterality does not affect the pathogenesis previously ascribed. If these patients live long enough, it is not improbable that more bilateral fractures will be observed.

Careful histological examination of multiple sections from the fracture site and adjacent bone revealed no metastatic involvement.

In the case given an autopsy, the intervening tissue had necessarily been irradiated as the right lateral trochanteric port received 3,000 roentgen units, and the depth dose to the tumor through this port was 840 roentgens calculated at 16 cm depth. The skin showed marked bronzing and epithelial desquamation. Subcutaneous induration, ureteral occlusion, intestinal obstruction with stenosis, and multiple fistulas were also present. All of these changes were bilateral. Because of the proximity of the femur to the surface, the depth dose to the bone and its vascular supply is practically the same as

the surface dose. This must be borne in mind in evaluating the term "relative radiation resistance." Excessive dosage of roentgen therapy, whether given in one prolonged cycle or in smaller repeated cycles, imperceptibly reaches dangerous proportions, the consequences of which become more serious with the lapse of time. The pathological findings of the autopsies are characteristic of radiation effects.

EDWARD L. CORNELL, M.D.

Wetterdal, P. The Use of Heparin in the Prevention of Thrombosis after Gynecological Operations (Ueber die Anwendung von Heparin als Prophylacticum gegen Thrombosen nach gynäkologischen Operationen) *Zentralbl f Gynaek*, 1941, p 173

The author demonstrates the value of heparin in the prevention of thrombosis. After operations for myoma and prolapse, thrombosis and embolism frequently occur, particularly in the cases of fat, elderly anemic women as well as those of women with damaged hearts and those who have previously suffered from thrombosis.

The author gives heparin for eight to ten days after the operation, 50 mgm of heparin are given at 8, 12, and 4 P.M., and 100 mgm are given at 8:00 P.M. The first injection is given eight hours after the operation. Heparin was used in 132 cases, and for treatment in 22 cases. The results were completely satisfactory, there was only 1 failure, in a patient who had a definite tendency toward bleeding.

The author does not wish to draw any general conclusions on the basis of his comparatively small number of cases, however, he asserts that there is a comparative lack of danger in the use of heparin.

(RUDOLF HEMMEYER) JACOB E. KLEIN, M.D.

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Torpin R and Hart B F Placenta Bilobata
Am J Obst & Gynec 1931 41 38

From this present study of a large series of cases by the fetal sac dissection method it has been found that most of the placentas consist of only two lobes one of which is usually primary and much larger than the other. It is also apparent that the two lobes usually lie one on the anterior and one on the posterior wall of the uterus and that the two lobes are joined together either at the side or over the apex of the uterine cavity.

The condition has been shown to be associated not infrequently with low implantation of the placenta, a double type of placenta previa being formed. This probably has been mistaken for placenta previa centralis.
 EDWARD L. COUNELL, M.D.

Mirchner O Results in the Treatment of Placenta Previa at the City Gynecological Clinic in Essen in the Years from 1923 to 1937 (*Zeitschr f Geburt u. Gynäk*)
 Sta durch n Frauenklinik n Essen in den Jahren 1923-1937. Monatsschr f W. Dissertation 1940

Among 832 labors there were 120 cases of placenta previa (14.3 per cent). Two-thirds were in primiparas, 59 were in para vi to para xii in para vi to para x3 and 11 in para xi to para xvii. The following methods were employed in treatment:

In 9 cases there was conservative expectant treatment of spontaneous delivery (1 dead children); in 5 rupture of the membranes (2 dead children); in 17 metrorrhagia (14 dead children and 3 dead mothers); in 10 Braxton Hicks motion (1 dead mother and 9 dead children); in 6 version and extraction (6 dead children and 1 dead mother); in 11 ectophrystotomy (9 dead children) and in 62 abdominal cesarean section (11 dead children).
 (Zusammenfassung von W. Birk, M.D.)

Benedek A The Fate of the Fetus after Threatened Abortion (*Das Schicksal der Frucht n. h. drohe d. F. Abg. b. d. Zuck. f. Geburtsh.*)
 C. v. 1931 22 66

The author reports 61 cases in which abortion was threatened one or more times during the pregnancy but with cessation of the danger the pregnancy went on to full term and resulted in delivery. Thirty-five of the women were between the ages of twenty and thirty and 21 between thirty and forty. Three were under twenty years and 5 were over fifty. Their pregnancy was the first. In 31 cases spontaneous abortion had taken place before and in 2 the history showed abortion four times.

In cases of abortion we must think of two causes: (1) functional disturbances of the endocrine system and (2) deficient absorption of the vitamin

essentially Vitamin F. According to Seguy both of these causes are related and are due to the same disturbances. The 61 patients with threatened abortion left the clinic with retention of their pregnancy. But in 8 instances there were later bleedings and low abdominal cramps. In 1 of 4 cases with later toxemia eclampsia developed. Furthermore there was the case of twin pregnancy and of uterine ganglion. These 6 complicated cases ended with 5 full term and 2 premature births. In the total cases there were 45 births at term. The number of premature births was relatively high. In a large series of cases they seem to include from 5 to 10 per cent of the births. The developmental disturbances found were polydactylism, atresia of the small intestine and hypoplasia. If we remember that malformations occur in about 2 per cent of the cases (1.3 per cent of 17,000 according to Naujoks and 0.6 per cent according to Mall) we may consider that 3 in 62 cases is high (4.8 per cent).

Fifty-three of the babies left the clinic alive. Thirty-two of these could be observed later and of these 9 boys and 13 girls or 22 (17 full term and 5 premature) were perfect. Body and mental defects were found later in 10 children: 4 boys and 6 girls of which 4 were born at term and 6 prematurely. A premature born girl died on the nineteenth day after birth of congenital weakness. Two of the 10 defective children had their defects from birth. In addition 3 others of the 10 had cere anomalies. One eight-year-old microcephalic boy has Little's disease. Another microcephalic boy is eight years old. One nine-year-old child has dorsal scoliosis, is stunted and mentally deficient. Four of the 10 children had cerebral defects and all four of them had been born prematurely. It must be emphasized that in these cases with developmental defects the possibility of intracranial hemorrhage was not present at birth and also that no later evidence of hemorrhage was found. It is impossible to state which of the numerous possibilities caused the anomalies.

We may draw the conclusion that among the cases of pregnancy in which abortion threatens without an apparent cause, the cause is premature labor and malformations will occur in greater number than among normal cases and that in the children who survive there will be more bodily and mental defects.
 (Ludwig) Leo J. Juchacz, M.D.

LABOR AND ITS COMPLICATIONS

Fallon C D and Mueser R D The Value of Calcium in Labor and in Uterine Inertia
Am J Obst & Gynec 1934 4 948

The authors undertook an investigation of the effects of the intravenous administration of calcium salts in labor for two reasons: (1) they questioned whether

calcium might relieve the pain of uterine contractions, and (2) they wished to determine the effect of calcium on the contractibility of the human uterus during labor.

The 26 pregnant women who were observed in the authors' study were on a private and semi-private obstetrical service. They were at or near term and were either in labor or were undergoing attempted induction of labor. These conditions made it impossible to complete the observations concerning every patient. Calcium gluconate was used exclusively in the work, because it is less irritating locally than other calcium salts.

No relief of labor pains resulted from the injection of calcium. In fact, in many instances the intensity of the pain was increased.

The effect on uterine contractions was one of stimulation. Twenty-four of the 26 patients experienced an increase in the frequency of contractions. Fifteen of the 26 patients experienced an increase in the intensity of the contractions, and this number includes 1 patient in whom the contractions did not increase in frequency. The duration of each contraction was not changed much from the duration of contractions in the average labor. In no case did tetanic spasm of the uterus occur, such as frequently results from the administration of injudicious doses of the oxytocic principle of the posterior lobe of the hypophysis.

Four cases were reported to depict the decided effect which may be obtained by the administration of calcium.

Twenty-three of the 26 patients experienced definite stimulation of the uterus, in the form of an increase in either frequency or intensity of contractions, or both, after the administration of calcium gluconate. One of the 26 patients experienced no increase in stimulation of the uterus over that degree of stimulation which commonly would have occurred had she not received calcium gluconate. There was no change in the uterine contractions after the administration of calcium, and the content of calcium in the blood did not increase twenty-six minutes after such administration. However, the intensity of uterine contractions increased markedly forty-five minutes after the injection of calcium and the delivery of the child occurred spontaneously five hours later. The increase in uterine contractions was so transitory in 2 cases that it could not be considered a true stimulation. One patient was not in labor, Braxton Hicks' contractions increased after the injection of calcium, but she experienced no true labor pains. Another patient also was not in labor. The medical induction of uterine contractions by means of castor oil and 10 injections of the oxytocic principle of the posterior lobe of the hypophysis (pitocin), 2 minims at each injection at thirty-minute intervals, had been completed four hours previously, and she was experiencing mild pains every five minutes at the time the authors began treatment. After she had received calcium, the pains increased in frequency so that they

occurred every three minutes, but they ceased after fifteen minutes. The value for calcium in the blood was low and did not increase much.

In 3 of the 23 patients for whom treatment was successful, the increase in contractions was of short duration.

In 4 other of the 23 patients in whom treatment was successful, no progress toward the desired objective was noted, despite the increase in uterine contractions.

In the remaining 16 cases of the 23 in which the administration of calcium was successful in increasing the effectiveness of uterine contractions, the patients progressed uneventfully to parturition after the injection of calcium. Of these patients, 13 were delivered within four hours and 1 each was delivered in five, seven, and nine hours, respectively. All but 1 gave birth to infants spontaneously. For the one who did not, delivery with the low application of forceps was done because of slowing of the fetal heart.

No marked systemic effect was observed after the administration of calcium. Five of the 26 patients regurgitated the gastric contents during the injection, but even these patients experienced little nausea. Regurgitation was not considered to be an indication for discontinuance of the injection of calcium.

In general, systolic and diastolic blood pressures and pulse pressure tended to show an increase when readings were made five minutes after the injection of calcium. The rate of respiration did not change more than 6 per minute for any patient, and the increase and decrease was distributed approximately equally. Variations in the blood pressure and pulse after the injection of calcium were as inconclusive as those published by other investigators.

A vasomotor wave, characterized by the subjective feeling of warmth in the patient's skin, could be induced at will by the rapid injection of a solution of calcium gluconate. This symptom was not a cause for complaint if the rate of injection was 4 c cm per minute, or less, of the 10 per cent solution.

The effect of the injection of calcium upon the content of calcium in the blood was not constant. Whether or not results would be the same if calcium were administered to non pregnant women, it would be difficult to predict. The calcium content of the blood increased during the first few minutes (five to thirty minutes) after the injection of calcium in 19 of 20 cases in which determinations were made both before and from five to thirty minutes after such injections. The increase, however, was not proportional to the amount of solution injected, or to the quantity of solution of calcium gluconate injected per kilogram of body weight. The increase expressed in milligrams of calcium per 100 c cm of blood varied from 0 to 2.72 and the average increase was slightly in excess of 1.32, based on the calculation for 21 patients, and not on all 26 of the series.

A few patients complained of a sensation of faintness and of profuse perspiration during the injection.

INTERNATIONAL ABSTRACT OF SURGERY

450

of the calcium. Reductions of values for blood sugar of from 10 to 31 mgm per 100 ccm within from five to fifteen minutes after the intravenous injection of calcium salts have been reported. The secretion of fatness and complaint of profuse perspiration previously mentioned may be referable to the temporary presence of hypoglycemia. The symptoms disappeared after the injection had been completed and in no case was it necessary to cease administration. The administration of calcium was continued for from thirty to sixty seconds however as a precautionary measure. None of the babies born to these 26 mothers exhibited any ill effects referable to the administration of the calcium.

The chief contraindication to the intravenous administration of calcium salts is the presence in the body of drug of the digitalis group. Digitalis and calcium exert an additive effect on the heart so that there is danger of the production of ventricular standstill if the two drugs are used concomitantly. Theoretically a value for blood sugar which is already low may be further lowered to a point at which hypoglycemic symptoms will be produced in the patient. Glucose administered intravenously would in such circumstances counteract the production of hypoglycemia and so that the possible production of hypoglycemia is not to be considered a contraindication to the administration of calcium. The value for blood sugar is carefully maintained at normal by means of the administration of glucose. It seems probable that stimulation of the uterus by the administration of calcium may be employed to good advantage clinically in cases of uterine inertia. Utilization of the effects of calcium appears successful when the patient is in the time there labor. The duration of the effect of calcium has to be from two to three hours. If the time there not accomplished its purpose with the time there seems to be no reason why it should not be administered again. Even though calcium does increase the frequency and intensity of uterine contractions it cannot be expected to overcome the fact which is produced by pelvic disproportion and the fact which is produced by the present part and the fact which is produced by such a type of dystocia proper point on of the present part and the fact that it does not overcome such an objection to its administration. The obstetrician need not fear that rupture of the uterus would result from over stimulation by calcium in such cases of dystocia. The ideal case in which to use calcium would be moderate and occur less often than a very large which the uterus is not obstructed. Dilatation of the cervix is of no moment in such a case it would be a natural expectation that the frequency and intensity of uterine contractions of that labor would be terminated soon rather than would be the case if calcium had not been employed. If calcium should be used therapeutically hard frequent uterine contractions would render its administration unnecessary but in the authors study no harm resulted from its use in such instances. Comparatively small doses of analgesic agents in the form of pentobarbital sodium or ether of paraldehyde were administered orally to some of the patients according to the usual indications for such agents until the effect of the analgesic agents was established. It would be prudent to withhold analgesic agents from calcium-treated patients who have uterine inertia until definite progress has been made. If analgesic agents are administered they must be used with the knowledge that they may defeat the purpose of the calcium.

The authors conclude that the administration of calcium will not relieve labor pains. The administration of calcium will increase the intensity of uterine contractions but will not increase the duration of contractions. It is most useful in stimulation of the uterus in cases of inertia in the first or second stage of labor but it cannot be expected to overcome severe dystocia. The administration of analgesic agents such as pentobarbital sodium and paraldehyde may defeat the purpose of calcium in some cases of uterine inertia. The administration of calcium apparently has no ill effects on newborn babies whose mothers received calcium intravenously during labor. On the basis of reports in the literature it would appear that calcium should not be administered if a drug of the digitalis group has already been administered.

Beck A C Taylor E S and Colburn R F
Vitamin K Administration to the Mother During Labor as a Prophylaxis Against Hemorrhage in the Newborn Infant
Am J Obst Gynec 94 4 65

Clotting activity was studied on the first second and fourth days of life in a series of 200 infants. Vitamin K was given during labor to the mothers in alternate cases. A study of the control infants who were not given Vitamin K showed that clotting activity appeared on the first day of that which is observed in normal infants. A physiologic fall in prothrombin usually occurs on the second day. The fall at times may reach dangerously low levels. Fifteen per cent of infants whose clotting activity fell below 35 per cent of normal value showed a decrease in hemoglobin. By the fourth day clotting activity values tend to approach the level of the first day by the sixth day. The authors said to reach this level by the sixth day and to approach it by approaching that observed in the normal adult may be obtained on the first day by the administration of Vitamin K. Administered to the mother during labor Vitamin K prevents the physiologic fall in prothrombin values which commonly occurs on the second day of life. Only one infant in a series of 200 who received Vitamin K during labor had a low value for clotting activity.

and, in this instance, it was 38 per cent of the normal adult value on the fourth day only

The use of Vitamin K during labor and antenatally should prevent some of the hemorrhages which occur in the newborn infant. Only 5, or 0.5 per cent, of 1,022 infants whose mothers received Vitamin K showed any evidence of hemorrhage, in contrast to 21, or 2 per cent, of 1,037 control cases. In this series of 2,059 cases, in which the alternate mothers received Vitamin K, it appears that this drug reduced the incidence of hemorrhage approximately 75 per cent in the newborn infant. Vitamin K, accordingly, should be very valuable in reducing the incidence of hemorrhage in all newborn infants. This should be true especially when they are born prematurely or after long labors and difficult operative procedures.

EDWARD L. CORNELL, M.D.

PUERPERIUM AND ITS COMPLICATIONS

Hernuss, K. The Use of a Sulfonamide Preparation in the Puerperium (Ueber Verwendung eines Sulfonamid-Präparates im Puerperium) *München med Wchschr*, 1941, 1: 20

Attempts to use sulfonamide preparations in puerperal infections gave surprisingly good results. Albucid of the Schering firm was employed and was given exclusively by the intramuscular route in order to obtain a more continuous action. Timely and constant administration as well as a sufficiently high dosage of the substance were important for the success of the treatment. The author observed the best results from the prophylactic use of albucid which was injected in daily doses of 5 c. cm. for at least three days in cases threatened by infection; the preparation was given for as long as one week under control of the blood picture in persisting sepsis. No local or general damage has been observed in about 100 injections given up till now, and the drug has been well supported.

The demonstration of the presence of albucid was made by a personal method: the addition of a few drops of Ehrlich's aldehyde solution produces a yellow color in body fluids containing albucid. By this method it was possible to demonstrate the passage of albucid into the cerebrospinal fluid, the lymph spaces, and the mother's milk. The concentration of albucid in the milk was so low that there was no danger of the child's being injured.

(K. HEISING) RICHARD KEMEL, M.D.

Goodall, J. R. Gynecological and Puerperal Thrombophlebitis Contrasted with Phlegmasia Alba Dolens. *J Obst & Gynaec Brit Emp*, 1941, 48: 220

Goodall, of Montreal, presents a comparative didactic discussion of postoperative and puerperal thrombophlebitis contrasted with phlegmasia alba dolens as to etiology, pathology, diagnosis, prognosis, and therapy.

Thrombophlebitis, in Goodall's opinion, cannot occur without infection, although the agent may be

mild and systemic reactions absent. The origin, in the vast majority of cases, is from a "diseased, traumatized mucous membrane." Phlegmasia is an infection and blocking of the minute lymph channels of the tissues involved. The condition usually occurs primarily in the uterus, the cervix, or both. It may remain localized or spread widely; involvement of the leg representing probably the most common extension.

Clinically, the two diseases in their early stages are indistinguishable and rarely diagnosed. They may be suspected when "temperature and pulse rate show indications of a symptom-free infection following operation or labour." Thrombophlebitis often is first diagnosed by its embolic or metastatic complications. Phlegmasia is recognized commonly, after extra-uterine spread has occurred and marked "involvement of the pelvic cellular tissues, or those of the leg, has taken place."

The chronic sequelae of phlegmasia are more distressing than those of thrombophlebitis. The former consist of frequent persistent pain in the part involved and permanent lymphatic block producing plasma edema of the tissues below the site of blockage. If the infection is prolonged an extensive marked incapacity results.

The therapy of phlegmasia is discussed. In the chronic state topical applications are futile and cervical operations usually are contraindicated. Should pregnancy occur, every effort is made after delivery to hasten involution of the uterus with stimulants. In addition every means of heightening the patient's resistance should be used, chief among which are the reticulocellular activators, repeated blood transfusions, or small doses of insulin, of thyroid, or of all three under careful supervision, and a well regulated diet, sunshine, natural or artificial, and heat.

WILLARD G. FRENCH, M.D.

NEWBORN

Lund, C. J. The Prevention of Asphyxia Neonatorum. *Am J Obst & Gynec*, 1941, 41: 934

The rational approach to the problem of asphyxia neonatorum is by prophylaxis, notwithstanding the voluminous literature concerned with therapeutic methods. Analysis of the etiological factors of asphyxia as seen in 2,006 consecutively born infants reveals the following:

1. *Parity.* Asphyxiated babies occurred in 18.9 per cent of the primiparas, and in 11 per cent of the multiparas, but after the eighth child asphyxia increased with parity.

2. *Prenatal complications.* Increased asphyxia from 11 per cent in the uncomplicated cases to 26 per cent in the complicated cases. Metabolic diseases, soft and bony pelvic abnormalities, toxemias, multiple pregnancy, and diseases of the gastro-intestinal and urinary tracts were followed by the greatest incidence of asphyxia.

3. *Prematurity* was the greatest single factor in this series, most dangerous when combined with

INTERNATIONAL ABSTRACT OF SURGERY

452

analgesic drugs asphyxia was found in 70 per cent of these cases

4 *Presentation and position* Breech presentation was followed by asphyxia in 27 per cent of the cases occiput posterior position in 18.2 per cent and occiput anterior presentation in 12.2 per cent

5 *Duration of labor* Only when the first stage was over thirty hours was there a marked increase in a phylia. A second stage of over one and one half hours was followed by a progressive increase in a phylia

6 *Type of delivery and trauma* Spontaneous deliveries showed a phylia at a rate of 10 per cent. The use of non volatile analgesics before operative delivery greatly increased a phylia

7 *Complications of labor* Variations in rate and rhythm of the fetal heart, maternal bleeding, cord prolapse, operative dystocia and prolonged labor were accompanied by asphyxia neonatorum in from 35 to 55 per cent of the cases. Uncomplicated labor resulted in asphyxiated infants in 12 per cent of the cases

8 *Analgesics* The analgesics studied were primarily heroin and morphine with or without scopolamine. In spontaneous deliveries heroin stood midway between the group receiving no sedation and that receiving morphine. This advantage was lost following operative deliveries. Repeated administration of heroin was followed by increased asphyxia in spite of its rapid action

9 *Medical induction of labor* had little effect on asphyxia

10 *Infant complications* increased from 17 per cent to 45 per cent when the infant was asphyxiated at birth. Ten cases of permanent damage of the central nervous system were found. 5 of the infants had had asphyxia at birth

The individual evaluation of every obstetrical case on the basis of fetal a phylia risk as well as a general obstetrical risk is advised. Prenatal care and the conduct of labor on this basis should result in a substantial reduction of the incidence of a phylia in a neonatorum

EDWARD L. COR. XII, 14 D

MISCELLANEOUS

Olsen A. *Nursing under Conditions of Thirst*
Excessive Ingestion of Fluids *A is bit dry*
Scand. 194. 2. 313

Although the domestic cow is considered the best milk producing animal yet developed it has never been found that lactating cows need or would take a greater amount of fluids than dictated by their normal thirst. To evaluate the common teaching that a lactating woman should push fluids beyond the satisfaction of her daily thirst the author studied the relationship between fluid intake and milk output in 13 nursing mothers. In successive periods of from three to five and in 4 cases ten days each the daily fluid intake was made half or double the average normal amount desired before the experiment. The following may be concluded

Even great variations in the quantity of fluid ingested are in general without effect on the daily breast milk supply. A supplementary fluid intake is not necessary to maintain fluid balance either in preparation for nursing or to augment the breast supply. The mother will suffer from thirst long before the baby hence the amount of fluids to be consumed may be left entirely to physiological regulation. The development of hypogalactia cannot be arrested by forced drinking. Forced drinking does not increase the milk supply and may actually be harmful

E. S. BURKE M.D.

GENITO-URINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Schroeder, C. H. Cystic Hemorrhagic Struma of the Adrenal Gland (Die Struma suprarenalis cystica haemorrhagica) *Arch f klin Chir*, 1940, 199 595

Up to the present 20 cases of blood cysts of the adrenal gland have been reported, of which 16 were operated upon, 11 with success.

In an additional case reported by the author there was an enlarging tumor in the left side of the abdomen of a sixty-one-year-old woman which was associated with a sensation of pressure and pain noticed for one year. There was no remarkable past history, except that the woman had had 12 normal confinements. Clinical examination revealed a large retroperitoneal tumor which was not disturbing the function of the left kidney to any extent but had displaced it downward and twisted it about 90 degrees. At the operation, performed through an oblique lumbar incision on the left side with resection of the twelfth and eleventh ribs, the entire tumor which extended downward as far as the bladder was removed. The tumor had to be separated by sharp dissection from the spleen, the descending colon, and the bladder, and the left kidney had to be sacrificed. A large cyst measuring 27 by 14.5 by 12 cm. was obtained which contained about 4 liters of a chocolate brown mixture and colored gelatinous masses, at its upper pole there still remained the remnant of the left adrenal gland. Stripping of the epithelium revealed only granulation tissue with abundant foreign-body giant cells and deposits of hemosiderin. The left kidney revealed an old ascending nephritis. The adrenal gland appeared to be the site of origin of the cyst, the adrenal-gland cells could be stripped away in other cases (Kuettner, Brand).

It is possible that this was an adenoma, which, just as a goiter, changes itself into an ever-increasing cyst, so that the name cystic hemorrhagic struma of the suprarenal gland would be applicable, however, hemorrhage which has been frequently seen in the adrenal glands of the newborn might be the cause of the cyst. Finally, scattered rests of the wolffian body as well as a lymphangioma might be considered as the cause of such a lesion. It is noteworthy that women have suffered from this lesion much more frequently than men, a fact which may be related to the genital function and a greater tendency toward bleeding. Up to this time the diagnosis has not been made before operation, and beyond the recognition of a tumor at the upper pole of the kidney, nothing can be determined. The exact evaluation of retrograde and excretion pyelography could be investigated further. Aspiration with the recovery of a chocolate brown fluid also is an important diagnostic finding. Hemorrhagic cysts of the spleen as well as perirenal hydronephroses usu-

ally have a previous history of trauma. Hemorrhagic cysts of the pancreas lie more toward the midline. At operation complete removal of the tumor should be attempted under all circumstances for of 4 cases treated by marsupialization, 3 terminated fatally. (MAX BUDDE) JOHN R. PARNE, M.D.

Fowler, H. A. Bilateral Renal Ectopia. A Report of 4 Additional Cases. *J Urol*, 1941, 45 795

Bilateral renal ectopia is the rarest type of renal anomaly encountered, either clinically or at autopsy. Both kidneys are congenitally misplaced and may lie at the same or different levels. Fusion may occur but this is apparently rare. In the event of fusion, the conglomerate renal mass may lie deep in the pelvis and form the so-called lump, cake, or shield kidney. The author does not know of any such case that has been observed clinically. The incidence of renal ectopia of all types, in autopsy records, varies between 1 in 650 to 1 in 1,500. The Mayo Clinic gives the ratio as 1 in 1,200, but clinically the condition occurred once in 10,000 cases. This discrepancy between the autopsy and clinical incidence is explained by the fact that many cases are asymptomatic and no special examinations were made. Renal ectopia is often found accidentally during an exploratory laparotomy for other conditions unrelated to the kidney anomaly. Under these conditions, no treatment for the latter is indicated.

In reviewing a clinical group of 22 cases the predominant symptom was found to be pain. This is the chief complaint on admission in almost every case. It varies in intensity from a deep seated ache to intermittent attacks of acute, sharp, stabbing colicky pains. In character, location, and radiation it does not resemble the typical pain of renal or ureteral origin. It is usually referred to the lower abdomen, and suggests a low abdominal lesion involving the appendix, or the pelvic organs in the female. This symptom is, therefore, misleading from the diagnostic standpoint. It is due to a condition within the kidney or ureter itself, the most common being hydronephrosis, pyonephrosis, and calculous disease. Tuberculosis and hypernephroma have not been observed. There is no syndrome characteristic of this anomaly and the condition is of itself asymptomatic. It is only in the presence of lesions such as those which commonly affect a normally placed kidney that symptoms are produced. In one of the author's cases the patient lived to the age of fifty-three years with no symptoms which were referable to her bilateral ectopic kidneys. It was only with the development of pyelonephritis in the left kidney that symptoms were produced. When infection has occurred, pain is often associated with chills and fever, nausea, and vomiting, together with urinary disturbances such as frequency, urgency, and dysuria.

INTERNATIONAL ABSTRACT OF SURGERY

A palpable mass in the lower abdomen is another important finding. This was noted in 9 cases. In 2 others a mass in the pelvis was felt on vaginal and rectal palpation. Unfortunately this is also likely to be misleading since it suggests appendicitis on the right side or an adnexal lesion. Urinary disturbances when accompanied by pyuria demonstrate infection and hematuria are important symptoms which demand a complete urological examination to reveal the anomaly. Obstruction at the pelvic outlet resulting in pelvic dilatation and hydronephrosis are frequently encountered. In addition to the usual cause the fact that in some cases the pelvis is altered only due to failure of normal rotation of the kidney may account for poor drainage. This condition is often unilateral.

Treatment may be conservative or radical. In intermittent dilatation with ureteral catheters and bougies may be employed. Retention of ureteral catheters in place for several days is a safer method of accomplishing the same purpose. This provides kidney drainage while effecting dilatation and avoids trauma and edema following intermittent dilatation. Thompson and Pace point out that dilatation is not as successful as it would be in the case of normally placed kidneys, and may do more harm than good. In their experience (unilateral cases) nephrectomy and pyelotomy are the operations of choice. In the bilateral hydronephrosis cases were done in only 1 case for hydronephrosis and a functionless kidney. The remainder of the cases were treated conservatively. Nephrectomy should not be undertaken lightly. The technical difficulties will deal with the abundance and its inaccessibility will be undertaken by the surgeon of a distention at the site of the ureter and its repair of the ureter. Nephrostomy and plastic repair are not reported and the ureteropelvic junction are not reported and probably are rarely indicated. Infection and pyelonephritis may be expected to respond to treatment in the same manner and to the same method as those employed in the treatment of similar conditions in kidneys in normal position.

LOUIS NEWELL, M.D.
Bonanome L. Four Clinical Cases of Papillary Tumors of the Kidney. *P.I.S.* (Surgical Abstracts) 1944, 94, 993.

Four cases of papilloma of the kidney are described in men of six, eight, thirty-three, fifty-eight, and forty-eight years. The tumor are rare but are being found more frequently since better methods of diagnosis are available. Some writers have held that all papillary tumors are malignant epitheliomas. However, this is not true. The tumors in all 4 cases described in this article proved to be pure papillomas on histological examination and their benign nature was proved by the good results of operation. The first patient operated on in good health even years after the operation.

The diagnosis is difficult. The chief symptoms—hematuria, pain, and swelling of the kidney—are common to so many diseases of the urinary tract that they only show the need of further investigation. However, with the aid of urinary and endoscopic and roentgenological examinations it may be possible to make a diagnosis. Ascending pyelography gives the best results in locating the tumor. Sometimes only a diagnosis of tumor of the kidney can be made. This is true in the author's first case in which descending urography did not give the necessary information and a descending urography was impossible. In the third other cases it was possible to diagnose tumor of the pelvis.

The operation of choice is total nephroureterectomy. It is a very serious operation and almost all surgeons prefer to perform it in two stages. The author performed nephrectomy in his cases and after recovery the patients refused any further operation. Only 1 of the patients had a recurrence in the stump of the ureter. The others have had no trouble so far. In his operations the author always ligated and sectioned the ureters first in order to avoid transection of the tumor cells into the stump of the ureter or bladder and then ligated the renal vein separately before isolating the kidney completely. He thinks roentgen radiation after operation may be useful. A histological examination has shown a papillary epithelioma.

A. DEB G. MORAN, M.D.
De Carlo J. Postcaval Ureter. *J. Urol.* 1944, 94, 457.

Since Hochstetter's first reported case of postcaval ureter in 1893, 25 cases have been recorded in the literature. Eight of the cases were found at operation and 17 were found post mortem. Although this is a rare anomaly it is not found as infrequently as was formerly thought. The anomaly is gradually emerging from the field of anatomical curiosities and is now incompatible with this anomaly and not a life is not incompatible with this anomaly and not all cases develop hydronephrosis and hydronephrosis as was formerly believed.

The case reported discovered during a general dissection is the twenty-sixth of its kind reported. In the period between 1911 and 1939 this was the only instance of postcaval ureter occurring in Anatolia. The body was that of a colored male aged thirty years. The cause of death was carcinoma of the esophagus. The right ureter on leaving the kidney passed horizontally in the middle of the lower third of the lumbar vertebra. It then passed dorsally to the postcaval area at the level of the body of the third lumbar vertebra. It next appeared between the aorta and the postcaval area and then crossed caudally and laterally crossing the ventral surface of the posterior vena cava to reach the right psoas major muscle 4.5 cm from the midline and the ureter then crossed the right external iliac artery and pursued its usual course to the bladder. Hydronephrosis and hydronephrosis were not present. There was a slight dilatation of the ureter but this occurred on the psoas major muscle distal to that portion of

the postcava involved in this study. At this point the ureter was 8 cm. wide.

The anomaly results through maldevelopment of the postcava and not of the ureter. The definitive post-hepatic vena cava is comprised of various segments and anastomoses between the paired post-cardinal, supracardinal, and subcardinal embryonic venous channels. The renal segment is usually formed by the persistence of certain portions of the subcardinal-supracardinal anastomotic pattern. In the present case the right supracardinal vein played the more important role in the transformation. As the mechanical effect of blood-flow straightened the embryonic vena cava, the ureter was caught by it and pulled medially, which resulted in the location of the adult ureter dorsal to the renal segment of the inferior vena cava.

From these cases the following statistics are taken.

Seventeen patients were males and 6 were females, in 3 cases the sex was not mentioned. The ages varied from birth to eighty-four years. Hydronephrosis was present in 18 cases, absent in 7, in 1 case no reference was made to this condition. The greater number of males is attributable to the greater number of male bodies received for dissection and necropsy. Four males and 4 females were found at operation.

The diagnosis of postcaval ureter has never been made postoperatively. In all cases of hydronephrosis on the right side, postcaval ureter should be considered a remote probability. Randall and Campbell claim that in an oblique roentgenogram the postcaval ureter will be found to impinge against the lower lumbar spine, while the normal ureter will fall away from it. Shih remarks that in a pyelogram, winding of the ureter around the inferior vena cava should be borne in mind when one encounters dislocation of the ureter to or beyond the midline. With these roentgen findings and with direct vision obscured by the presence of hydronephrosis, undue pulling to deliver the kidney through the lumbar route and the indiscriminate application of clamps should be avoided because of the danger of fatal hemorrhage following injury to the postcava.

LOUIS NEUWELT, M.D.

Hyman, A., and Leiter, H. E. Surgery of the Inferior Vena Cava in Urological Conditions. *J. Urol.*, 1941, 45: 813.

The authors have collected 11 cases in which operations upon the inferior vena cava were done, and review a number of features that are not only of scientific interest but are also of considerable practical importance. They give the symptoms and signs of obstructions of the inferior vena cava, a discussion of the literature, the prevention and treatment of accidental injury to this vessel, with the proper control of the resultant hemorrhage, the indications for intentional surgery upon the vena cava, and a presentation of 11 cases.

The symptoms and signs resulting from occlusion of the inferior vena cava depend upon the mechanical

obstruction *per se* and upon the cause of the obstruction. Other important factors are the position, the extent, the rapidity, and the completeness of the obstruction.

In obstruction of the lower third, edema of the legs, even in sudden occlusion, is often absent. Its presence is probably due to an associated block of the iliac veins. Edema of the abdominal wall is rare. Superficial collateral vessels are present in well-established cases and are almost invariably present in the groins and over the abdomen and flanks. If they are present on the legs, they are nearly always due to associated involvement of the iliac vein. Albuminuria is rare and, if present, is transitory and slight.

In obstruction of the middle third, sudden occlusions are probably invariably fatal. Edema followed by superficial collateral vessel formation occurs in practically all cases of gradual occlusion. Edema of the abdominal wall is not uncommon. Albuminuria is generally present at first and may be associated with other disturbances of renal function. Gradual occlusion above the renal vessels may, however, not result in even temporary albuminuria.

In obstructions of the upper third, sudden occlusions are fatal. Edema and superficial collateral vessels in instances of gradual occlusion present the same picture as that seen in obstructions of the middle third, except that the caput medusæ is more apt to occur. Obstruction of the hepatic veins is generally associated with disturbed function of the kidneys, liver, and other abdominal organs. Albuminuria is frequent, ascites and jaundice are common. Diarrhea and vomiting may result from congestion of the gastro-intestinal tract.

The collateral circulation in obstructions of the inferior vena cava is a fascinating example of the ability of the circulatory system to adjust itself. It forms the basis for the absence of edema of the legs in obstructions of the lower third of the cava and for the presence of apparently normal urine and normal kidney function, even when the openings of both renal veins are blocked; it explains the reason that a patient may live an active life for twenty-five years or longer with complete occlusion of the inferior vena cava. A review of the literature indicates that ligation of the vena cava below the level of the left renal vein (after a right nephrectomy) will usually be followed by an adequate collateral circulation. Ligation above the entrance of the left renal vein is almost invariably fatal.

The literature reveals that, with few exceptions, the cava has been inadvertently damaged during the course of operations upon the right kidney. The operations were difficult, the kidneys were adherent due to extensive perinephritis, and the pedicles were short, thick, and probably friable. The kidney may even be plastered to the surface of the cava, or the latter may be drawn up and angulated. Such situations are not uncommon in longstanding pyonephroses, tuberculosis, and in renal neoplasms. The authors are very "vena cava conscious" in difficult

types of nephrectomy for fear of caval injury. Thus in some pyonephroses subcapsular nephrectomy is preferred when there is most difficult mobilization. This however is not good practice in cases of neoplasia or tuberculosis as in these cases the capsule should be removed. In these cases the mobilization of the kidney especially near the hilum is done with considerable caution and preferably under vision. The chief modes of unintentional injury to the cava result from (1) laceration during the separation of the kidney (2) application of clamps or ligatures to the renal pedicle where the cava is angulated into the hilum (3) application of clamps in cases of short friable pedicles and (4) avulsion of the renal vein at its entrance into the cava by strong traction on the pedicle. One cannot stress too strongly the importance of adequate and good exposure and when difficulty is anticipated it is advisable to have a large incision and resect one or two ribs before beginning mobilization of the kidney. For large malignant renal tumors a transperitoneal approach is preferred by many surgeons.

Deliberate and intentional surgery of the vena cava has a narrow and limited scope. The Eck fistula is of doubtful clinical value. Tumor thrombi have been removed from the inferior vena cava and in some cases it is as possible to milk the thrombus bud projecting into the cava back into the renal vein before ligating the latter. In others it was possible to open the renal vein close to the cava and remove the thrombus by expressing it through this opening with a curet or forceps. In large tumor thrombi the cava may be opened between serrefine clamps the thrombus extracted and the opening clamped or sutured. When a well localized invasion of the wall of the cava is present excision of a part of the wall can be done. Or if the thrombus is adherent and below the left renal vein that portion of the cava theoretically can be resected. Ligation of the lower third of the cava may also be indicated in certain examples of sepsis in which the lesion is in the pelvis or lower extremities (phlebitis) and in which the infecting organisms are not vulnerable to the various sulfanilamide preparations. The ligation or opening of the inferior vena cava carries little added risk.

The first indication of an accidental caval injury is a sudden filling of the wound with dark venous blood. The blind application of clamps to control the bleeding must be avoided as the clamps will most likely not be accurately applied or the clamping of the duodenum may result in a duodenal fistula. Digital compression is preferable. If this fails a large pad is quickly packed tightly into the depth of the wound. The wound is then extensively enlarged with resection of one or two of the ribs if necessary while the operator controls the hemorrhage. The kidney is removed rapidly. A number of procedures are available for this purpose. Packing is the least satisfactory and generally leads to a fatality. With clamps in readiness the wound is sponged dry and the pressure on the cava slowly

released. The opening in the vessel is then quickly clamped with serrefine clamps above and below the point of injury for temporary hemostasis. It is important to note the degree of occlusion to the cava. If one can be certain that the application is below the level of the left renal vein there is no cause for concern. One of three methods is now available.

The clamps may be left in situ and surrounded by gauze. The handles are tied with heavy silk to prevent their accidental opening and covered with a wire basket. After five to seven days they are opened gently and removed on the next day. This method has been found most satisfactory.

Lateral ligation of the cava are apt to be unsuccessful as the suture tends to slip off.

Suturing of the rent with atraumatic silk is an ideal method of controlling hemorrhage but this is time consuming and should not be attempted if the patient's condition is poor.

Complete ligation of the cava is usually unnecessary. Its main danger lies in the fact that it may be difficult to determine whether or not the ligation has been applied below the left renal vein. These patients often require fluid by intravenous drip and transfusions. LOUIS NEWBOLD M.D.

Ascoli R. The Immediate Postoperative Treatment and the Fight Against Recurrence in Operations for Urinary Stone. (Die unmittelbare postoperative Behandlung und der Kampf gegen die Rückfälle bei Harnsteinoperationen.) *Ztsch f urol Ch u Gyn* 94 45 401

On the basis of earlier studies the author is of the opinion that three factors are of importance in the formation of recurrent calculi following operations for urinary stones: the calcium content of the urine, the phosphorus content and the urinary reaction. Practically the deciding factor is the alkaline reaction of the urine. This develops chiefly as a result of the fermentative formation of ammonium produced by various microorganisms. The recurrent calculi develop primarily; entirely in the infected cases.

The author considers that the sufficiency of the postoperative treatment is a basis for the successful result in patients operated for urinary stone. This treatment must be carried out with the greatest exactitude and thoroughness. The postoperative therapy is: (1) to be continued until the urine is free of the concentration of the urine the less will be the chance for the recurrence of the stone. The author administers fluid within the first twenty-four hours 500 c.c.m. of physiological salt solution and thereafter 1000 c.c.m. with concurrent continuous rectal drip infusion. Urinary tropin is administered as a prophylaxis against urinary infection preferably in the form of amphotropin in order to be sure of urinary acidification. The increased excretion of urea is not at all harmful to the healing of the wound. 1

Furthermore, the period following the treatment should be carried out methodically for at least a year following

ing the operation. In this the maintenance of a diluted urine is more important than a continuously acid reaction. The volume of urine which is excreted in twenty-four hours must always be determined. The author recommends that at least 2 liters of urine be attained in twenty-four hours. Instead of mineral waters, he recommends equal parts of distilled and well or spring water to be taken mornings on an empty stomach, 2 liters to be imbibed in the course of thirty or forty minutes. This course of diuretic treatment should be carried out two to four times per week. Contraindications to this treatment are heart disease, renal insufficiency, and elevated blood pressure. Beginning several months after the operation, there should be administered at two-month intervals a series of 12 intravenous injections of amphotropin or helmitol.

The author regards the employment of the badly borne and ineffective dietetic restrictions as inappropriate. He permits a mixed diet. It is desirable to avoid alkalinizing materials such as sodium bicarbonate or alkaline mineral waters.

(W KOENTIG) JOHN W BRENNAN, M D

BLADDER, URETHRA, AND PENIS

Warrick, W D. Cystitis Cystica, Bacteriological Studies in a Series of 28 Cases. *J Urol*, 1941, 45 835

Cystitis cystica is a well recognized clinical entity. The fact that the cysts *per se* rarely produce clinically recognizable symptoms is the reason that they have been overlooked in the past. Urologists have for many years recognized their presence in the bladder. The cysts occur not only in the urinary bladder but also in the urethra, ureter, and renal pelvis.

It occurred to the author that no attempt has been made to correlate a series of cases of cystitis cystica from the point of view of bacteriological studies, duration of urinary symptoms, and kind of urinary complications, if any. This article is based on the records of 28 cases of cystitis cystica. It was undertaken with the hope that it might stimulate the correlation of bacteriological as well as clinical findings in these cases.

The diagnosis is most commonly made cystoscopically. Characteristically, the cysts appear as small beads immediately beneath the surface of the bladder and covered only with a very thin layer of mucous membrane. Fine blood vessels may be seen in this covering membrane. The fluid is usually clear and translucent, but may have a slight yellowish cast. The common lesions vary from 2 to 5 mm in diameter. More often they are observed on the trigon, but frequently they are seen all around the bladder neck. Somewhat infrequently they are seen on the lateral walls and in the dome of the bladder. The cysts are usually discrete and often have a tendency to be arranged symmetrically. Several diseases may give a somewhat similar cystoscopic picture. Included in these are such lesions as

bullous edema, urethral polyps at the bladder neck, granular cystitis, cystitis follicularis, and cystitis emphysematosa.

The average age of the patients in the 28 cases studied was fifty-two years, the youngest being thirty-one and the oldest seventy-two. Nineteen (68 per cent) were females and 9 (32 per cent) were males.

The most common organism was the bacillus coli, found in 12 (43 per cent) cases. Eight (29 per cent) showed "no growth." The hemolytic bacillus coli was found in 4 cases (14 per cent), the proteus in 2 (7 per cent), the bacillus pyocyaneus in 1 case (3.6 per cent), and the bacillus diplostreptococcus also in 1 (3.6 per cent). Other organisms previously reported include the staphylococcus aureus, the staphylococcus albus, and short chained cocci.

The significance of these bacteriological studies is interesting. The author believes that he is in a position to refute the age-old saying that all cases of cystitis cystica are associated with bacillus coli infections, since this organism appeared in only 43 per cent of his cases. However, the time which had elapsed since the onset of clinical symptoms was sufficiently long in some cases to have allowed a change in the bacterial flora.

All histories were checked for 4 common urological symptoms. It was found that 93 per cent of the patients had burning on urination, 83 per cent had frequency of urination, 79 per cent had nocturia, and 29 per cent had hematuria. The author does not mean to imply that he believes the clinical symptoms were caused primarily by the cystitis cystica.

There was a great multiplicity of associated urological lesions. These included chronic pyelonephritis (5 cases), renal calculi (4 cases), benign prostatic hypertrophy (4 cases), chronic prostatitis (3 cases), acute pyelonephritis (3 cases), hydronephrosis (3 cases), chronic cystitis (2 cases), and 1 case each of stricture of the urethra, papilloma of the bladder, renal tuberculosis, carcinoma of the prostate, pyelitis, and ureteritis cystica.

There seems to be no definite correlation that can be drawn between cystitis cystica and its associated urological disease.

The author believes that the diagnosis of cystitis cystica would be made more often if microscopic studies were made more frequently as an adjunct to cystoscopy. When an obvious lesion is seen it is not unlikely that the presence of these cysts will be overlooked.

JOHN A LOEF, M D

GENITAL ORGANS

Greery, C D. Resection of the "Large" Prostate, Technique and Results. *J Urol*, 1941, 45 715

This is a report of transurethral resection done in 1,141 consecutive patients at the University Hospitals, Minneapolis, between April 1, 1930, and September 1, 1940. More than one operation was done in 23.9 per cent of the cases. The total mortality for the series was 4.4 per cent, and the average

total hospital stay sixteen and two tenths days. The average amount of tissue removed rose from 3.3 gm per patient in 1930 to 33.8 gm in 1939.

The amount of tissue removed exceeded 30 gm in 19 per cent of the whole series and in 38.3 per cent of those done in 1939 although the contractures and small prostates as well as all the operations of beginners are included. Thus it will soon be permissible to refer to the operation with some conviction as transurethral prostatectomy.

John A. Loe, M.D.

Bruni P. One Hundred Cases of Transurethral Prostatectomy (Una et al. J. Urol. 1940 9: 783)

Fueller in 1895 introduced the method of complete removal of prostatic adenoma through the bladder instead of simply removing masses that projected into the bladder in that way. Six years later Frey made improvements in the technique that led to the common adoption of the method. There is still considerable discussion as to the relative merits of transvesical prostatectomy and endoscopic resection as if one must necessarily be superior to the other.

The author discusses the question on the basis of the last 100 cases he has treated by the method of transurethral prostatectomy. They were all cases of definite adenoma of the prostate. He discusses the technique of his operation, the immediate and late functional and anatomical results and the clinical endoscopic and roentgen examination of the cases and gives tables showing the details of the results.

Summarizing his conclusions he says that there is no rivalry between transurethral prostatectomy and endoscopic resection. The former is the more radical method of treatment and is indicated in all cases in which there is definite adenoma. In small fibrous adenomas prostatic sclerosis and hypertrophy of the neck of the bladder and in the so-called prostatic bars endoscopic resection gives satisfactory results. If resection were used in the cases that would improve the late results of transvesical prostatectomy.

A history of gonorrhea was not frequent in the author's cases and he does not believe it is an important factor in causing hypertrophy of the prostate. If patients with hypertrophy of the prostate would come for treatment early the results of operation would be better. Careful preparation on the detail of which are given is important. Slow and gradual emptying of the bladder is to be preferred to emptying it at once by cystostomy. Or a small hemorrhage in the tissues and cat on for immediate operation. In addition to endoscopic and roentgen study renal function should be determined.

At present most of the patients cannot be operated on in one stage. Only 70 of the author's patients could be operated on in this way. The period between the suprapubic section and the removal of the adenoma varies it depends on the general condition of the patient and kidney function and only

to a slight degree on the fear of fibrous transformation of the adenoma. The best anesthetic is novocaine used locally for the suprapubic section and S. Hleich's mixture with gonemol for the adenectomy. The patient should be prepared with coagulants and a retention catheter inserted twenty-four hours before the adenectomy. The use of hypertonic salt solution and the hypodermic injection of small amounts of isotonic saline solution are valuable in combating anuria after transfusion.

The operative mortality in these cases was 6 per cent, the most frequent cause of death being heart or circulatory complication. The most frequent postoperative complications were delayed healing of the bladder wound, ascending pyelonephritis, orchitis, epididymitis and bronchopneumonia. Electrocoagulation of the fistulous tract as useful in the treatment of delayed healing if that failed cure could always be brought about by secondary suture. Adequate postoperative treatment is very important in determining the immediate and late results.

The late results in this series were good in view of the age of the patients. Of 78 patients examined three years or more after the operation only 6 had died and the ages of the survivors were seventy-one, sixty-four, sixty-four, seventy-five, sixty-three and sixty-two respectively. The deaths were from conditions outside of the urinary tract. The late functional results with reference to micturition were satisfactory. There was a residual urine of from 30 to 150 ccm in only 15 of 67 cases examined. The urine was sterile in 52 per cent of the patients examined. There was improvement in the renal function in almost all of the cases. The details are given in the tables. The late results as to renal function were also good. The late anatomical results in the bladder and urethra were satisfactory even when they were imperfect. They did not affect function appreciably.

Reopening of the bladder wound occurred in only 2 cases in which there was an obstacle to the normal discharge of the urine. When this was corrected the wound healed again. There was interference with normal urination in only 4 cases in which there was deviation of the prostatic urethra in a membrane at the neck of the bladder and in the last a membrane in the prostatic urethra with all of these conditions were corrected without difficulty.

No late complications such as those described by other authors including prostatic orchitis, epididymitis, carcinoma of the prostate, metastases, hypertrophic scar and incontinence of urine were seen in these cases. Calculi of the bladder or urethra developed after operation in eleven cases. Seven of the patients had stone before operation. The recurrence of the adenoma in any case. A metastatic recurrence was observed in one of the patients but the patient had decided evidence of psychic abnormality before the operation.

There is as yet not enough evidence to justify an unfavorable judgment on transurethral adenectomy and it is only not enough to abandon the operation.

AUDREY G. MIO, M.D.

Luescher, A Concerning 99 Cases of Cryptorchidism and Their Treatment in the Surgical Division of the Zurich Children's Hospital in the Period from 1928 to 1937 (Ueber 99 Faelle von Kryptorchismus und deren Behandlung an der chirurgischen Abteilung des Kinderspitals Zuerich in den Jahren 1928-1937) Zurich Dissertation, 1940

This study establishes the difference between retention of the testicle, in which the gland has not descended at all or has been arrested on its way to the scrotum, and ectopy of the testicle, in which the gland is found outside of its route of descent abdominal and inguinal retention on the one hand, and perineal, scrotofemoral, inguinosuperficial ectopy, and aberrant descent to the back of the penis or to the small pelvis on the other. The historical data on these anomalies are given. The reported frequency varies. Incomplete descent is reported by Wrisberg in 72 of 102 newly born children, by Sachs in 20 of 143 children, by Hofstaetter in 4 per cent of 450 newly born and in 32 per cent of prematurely born children, and by Lotheisen and by Eeches each in 23 per cent. Unilateral cryptorchidism is three times more frequent than the bilateral condition, and the right side is more often involved. Among the author's 99 cases there were 44 on the right side, 29 on the left side, and 23 were bilateral.

From the point of view of developmental history, the testicles lie at the level of the second lumbar vertebra behind the peritoneum at the upper medial extremity of the wolffian body during the second month of fetal life, from the fourth month on, they travel through the large pelvis and are found at the internal inguinal ring in the sixth month, and during the seventh month they pass through the inguinal canal. It is not yet known what forces act on the testicular descent. Grauhan invokes organotropism as well as the action of gravity. On the other hand, it must be considered as a phylogenetic phenomenon. Bramann has elucidated the behavior of the vaginal process and of Hunter's gubernaculum. The first reaches the scrotum earlier than the testicle and therefore plays a slight part in the descent of the testicle. It was formerly accepted that the gubernaculum reached from the lower pole of the testicle to the bottom of the scrotum. This is erroneous. It can never be followed further than to the inguinal region, and it turns into the cremaster by inversion.

What then are the causes of retention? It may be produced mechanically by adhesions or by complete or partial narrowing of the inguinal canal, or by abnormal shortness of the vas deferens and its vessels. Among the present cases, there were 5 of abnormal shortness and 4 of loop formation with abnormal length of the seminal cord. In 90 per cent of his operations, Buedinger found strands of scar tissue between the peritoneum and testicle which he attributed to a fetal peritonitis, however, this is a purely theoretical assumption. The author found these strands 10 times, but leaves the question open whether they are the cause or the result of the ab-

normal position of the testicle. Other causes may be the abnormal formation of the mesorchium and heredity. The author observed these causes 5 times. Atavism or intra-uterine anomalies of position of the fetus may also be the cause. On the other hand, the author found a primary atrophy of the testicle in 5 cases, which condition gives an unfavorable prognosis for the operation. In addition to these causes, Simmon has called attention to hemorrhage as a result of birth injury, especially in pelvic presentations. However, only one of the author's patients had been born in this presentation.

The examination of undescended testicles shows that they are of normal size in adolescents, but they are atrophied in adults. On histological examination Finotti found (1) earlier arrest of spermatogenesis, (2) signs of degeneration in the specific glandular tissue and in the connective tissue, and (3) an increase in the so-called intermediate cells of Leydig. These cells are always increased and, as a result, the testicle may have a normal size and yet be specifically atrophic.

As the presence of the testicle in the scrotum is indispensable for the development of the spermatozooids, operation must be performed before puberty. However, the male sex characteristics are not impaired in subjects with cryptorchidism because the internal secretion is insured by the well preserved intermediate cells and the cells of Sertoli. Fixed inguinal testicles undergo atrophy more rapidly than those which are loose in front of the external inguinal ring or are retained in the iliac fossa.

Among the associated incidents of undescended testicle hernia should be mentioned first of all. Uffreduzzi observed hernia in 90 per cent of his cases, Brunzuna in 58.9 per cent, and Heinicke in 85 per cent. The author found it in 50 per cent of his cases at operation. Confusion between incarcerated hernia and incarcerated inguinal testicle is frequent. Hydrocele is rare. The author observed it only once. He found phimosis in 4 cases, umbilical hernia in 3, hypospadias in 1 case, and other striking peculiarities in 8 cases. Uffreduzzi mentions that he observed mental inferiority in 10 per cent of his patients, but the author found only 1 imbecile boy in his series. Most of the children did not present any disturbances, and their cryptorchidism was discovered by the school physician. Only 12 had hernial disturbances and 7 complained of incarceration pain, although pressure could not be demonstrated. Eight complained of pain on protracted walking or exercising, and 6 had enuresis, they were not benefited by operation. The greatest danger is torsion. It requires immediate intervention because a torsion lasting more than twelve hours always leads to atrophy. The author observed 2 cases of torsion. On the other hand, he saw 4 cases of incarceration of the inguinal testicle which may be accompanied by fever up to 39°C. Another danger is inflammation caused by traumatism or infection. Malignant degeneration seems to occur 40 times more often in inguinal than in normal testicles, it is

more rare in abdominal testicles. However there is no doubt that this danger is exaggerated.

The treatment of cryptorchidism may be:

1. Orthopedic. In this type an attempt is made to bring the testicle down gradually by the use of massage.

2. Medical and hormonal. Schapiro has administered preparations of the anterior lobe of the hypophysis and reported 17 successful results. He injected 2 or 3 ampules of prehormone three times a week for from two to three months. Werner had 12 successful results in 17 cases with the gonadotropic preparation of the anterior lobe of the hypophysis. The author cannot state anything about the treatment with sexual hormones. However he is of the opinion that all cases with complications, those in which the testicle cannot be brought in front of the external inguinal ring by means of massage and those in which there is probably a connective tissue mechanical impediment to descent must be operated upon.

3. Surgical. The intervention must be performed before puberty in every case. Some authors recommend operation during the eighth or ninth month while others defer it to the twelfth or thirteenth year. The Zurich Clinic prefers to wait and most cases are operated upon from the second to the twelfth year. There are about 33 different procedures. The author mentions more particularly those of Schüller, Nikoladoni, Hahn, Katzenstein, Coujard, de Quervain, Maclaure and Anschuetz. The method of Ombredanne, i.e. trans scrotal orchidopexy, has been used nearly exclusively at the Clinic; it is based on the elasticity of the vaginal wall of the testicle. After mobilization of the testicle through an inguinal incision on a route into the scrotum is made by blunt dissection with a forceps the scrotum is then opened in the opposite side which discloses the scrotal vaginal wall; this is incised. The exposed testicle is pulled through this slit, the slit is caught round the testicle by a few sutures and the skin is closed. This operation was performed 103 times in the 99 cases and was highly satisfactory. In the other cases the use of other methods was impeded by the shortness of the external duct or of the vessels. The mortality was 1.

At control examination the size of the testicle was determined according to the method of Reich. He has established the size of the normal testicle in 200 children. He found that that of a nursing child is very little from that of a ten-year-old boy. After this age the period of growth begins and the greatest increase in volume takes place between the ages of fourteen and sixteen years. A table of sizes is given. According to this table the Clinic has obtained a very good result in 85 per cent of the cases and a satisfactory result in 95 per cent; the result was poor in 4 cases. The author compares these results with the statistics of Mache II, Tucker, Burkard, Hofmeister, Krauß, Bruzma and Johner. The comparison shows that the Ombredanne method, which has been used very little up

to now in Germany, is not in any way inferior to the other method and can be recommended because of its high percentage of correct positions and of postoperative growth of the testicle. Good results were shown even when the operation was performed during puberty.

(F. A. 2) RICHARD KEMEL, M.D.

Ormond J. K. and Prince C. L. Malignant Tumors of the Testicle. *J. Cr. I.* 1941 45 685

Testicular tumors have been observed at all ages but are commonly said to be most frequent between the ages of twenty and forty, the years of greatest sexual activity. The most common symptoms are swelling and pain, swelling being noticed first as often as pain. Other symptoms reported are abdominal tumor, loss of weight, cough, hemoptysis, indigestion, nausea and vomiting and enlargement of the ilio-supraclavicular glands. These of course are due to the effects of metastases.

During the quiescent period of growth the neoplasm is limited by the resistance of the tunica albuginea and for a long time retains the shape of an enlarged testicle. Therefore the shape is typically oval though spherical tumors are seen. The surface is usually smooth but as the tumor grows the tunica albuginea may become eroded and nodules form on the surface. The epididymis and cord remain unaffected for long time and the fact that the epididymis is flattened out on the posterior surface of the mass may be an important diagnostic point. The size varies greatly from a tumor but little larger than the normal organ to one the size of a football.

Metastases from tumor of the testis occur chiefly by way of the normal lymphatic drainage of the testis, i.e. along the spermatic artery to the retroperitoneal nodes, then the periaortic epigastric, mediastinal and supraclavicular glands may become affected.

In the differential diagnosis the following are always mentioned: (1) tumor arising from the structure surrounding the testis (which must be very rare), (2) syphilis, (3) tuberculo, (4) hydrocele, (5) old hematocele, (6) benign tumor.

There are two chief forms of tumor, the homogeneous compound of cells of a single type and the mixed tumor or teratoma. The pathology is indisputable, there being little doubt among pathologists. One believes that all these tumors are of raton or mixed tumors arising from primitive cells which are totipotent and can therefore give rise to tumors composed of cells of any of the primitive germ layers. The school believes that there are two main types of testicular tumors, the teratoma and what they call the seminoma, which they believe arise from the cells lining the seminiferous tubules. These appear in the form of a very slowly growing nodular solid and when cut present a surface which is fleshy and homogeneous.

There are at present 5 methods of treatment: (1) orchidectomy alone, (2) deep x-ray therapy alone,

(3) orchidectomy followed by deep x-ray therapy, (4) orchidectomy with pre-operative and postoperative x-ray therapy, and (5) radical orchidectomy with removal of the draining lymphatics

Deep x-ray therapy alone is rarely practiced except in obviously inoperable cases, and even in these the testis is usually removed for diagnosis. Orchidectomy followed by deep x-ray treatment, or both preceded and followed by it, are the methods advocated by most, and the two methods seem to have about an equal number of adherents. The qualitative and quantitative determination of prolan A is recommended as a differential diagnostic procedure before operation, as a means of determining the presence of metastases after removal of the tumor, and as a guide to the repeated use of x-ray therapy.

JOHN A LOEF, M D

MISCELLANEOUS

White, E C, and Hill, J H. Bacterial Urease Critique of Methods Heretofore Used for Demonstrating Bacterial Urease and Presentation of Valid and More Sensitive Test. Study of Ureolytic Action of Bacteria of Significance in Genito-Urinary Infection. *J Urol*, 1941, 45 744

The ability of an organism to hydrolyze urea to ammonia and carbon dioxide is of interest from the standpoint of classification, and also has an obvious bearing on the possible etiological function of the organism when present in the urinary tract in cases of alkaline urinary lithiasis.

Published methods for the demonstration of bacterial urease are reviewed, and it is shown that all

contain potential errors. A modification of the method of Wohlfeil and Wollenberg is presented by which a positive result rigidly indicates bacterial urease. A negative result means that there is insufficient urease available to produce as much as 0.002 mgm of ammonia by the hydrolysis of urea, under the conditions of the test. The delicacy is greater than that obtainable by other methods for the demonstration or quantitative determination of ammonia.

The role of ureolytic bacteria in the decomposition of urine has been recognized since the time of Pasteur. The clinical significance of this type of bacterial enzyme action, especially in recurrent lithiasis, is receiving increasing recognition.

The ureolytic action of a number of bacteria has been studied by the authors with the following findings:

All urinary proteus and proteus morganii strains tested were strongly ureolytic.

A differentiation in ureolytic action was observed between strains of aerobacter and of escherichia while all of the former were markedly ureolytic, less than half of the latter showed urea-splitting action and this amounted to only a trace.

Ten of 17 strains of pseudomonas aeruginosa were ureolytic.

Of 103 staphylococcus-micrococcus strains 70 per cent were ureolytic. This was in sharp contrast to both the streptococci, of which only 1 of 33 strains showed this action, and to the pneumococci, none of which was ureolytic.

Very little urea-splitting was observed in the strains of neisseria tested.

JOHN A LOEF, M D

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES JOINTS MUSCLES TENDONS ETC

Gruening P. The Distribution of Lesions of Muscles, Bones and Joints Through Work with Compressed Air Machines with Special Reference to Their Localization (Die Verteilung der Erkrankungen der Muskel, Knochen und Gelenke durch Arbeit mit Compressed Air Maschinen bei der Arbeit in der Bergbauindustrie). Munchener Medizinische Wochenschrift 1940

Compressed air machines are portable work apparatus which use stored up energy in the form of compressed air to transform energy into work. The compressed air hammer is used in the coal mining industry to break through coal and the air hammer in the iron industry is used as a rivet hammer. The action produced by the compressed air in the machine is made up of rapid vibrations which occur from 60 to 400 times a minute. The vibrations of the machine drive before it a tool which is either chisel shaped and sharp or like a hammer and blunt. In coal mining, the hammer is used to break down the coal and the chisel for boring the gun holes. In the iron industry the compressed air hammer is used for shaping the head of rivets and closing seams, also for beveling and shaping sheet borders. In quarries and road making its use is considerably less. There is a marked vibration of the body in addition to that of the holding arm which can after year of vibrations result in disease changes in the arm. An order was issued in 1929 which provided for compensation in occupational diseases and which recognized as occupational diseases the lesion of the muscles, bones and joints caused by work with compressed air tools. Angioneuroma of the finger capillaries and a decrease in function of the peripheral nerves were not included. In addition to the joint changes in the arms semilunar bone necrosis was also recognized as an occupational disease. Muscle injuries are rare.

This investigation includes the years from 1900 to 1938 when occupational diseases were recognized as the result of the use of compressed air machines in Prussia. Of 688 patients the greatest number were from the coal mining industry and only 7 from the iron industry. Seventy seven per cent of the disabled were at their labor longer than ten years. The length of disability varied between five and twenty nine years. The right elbow joint was involved the most frequently. That is natural as the handle is held by the right arm and suffers the recoil while the left arm supports the tool only on the under side. No tool believes the origin of the joint injury is from this recoil. The ulna and radius will be hammered toward each other in quick succession. The causes pressure necrosis of the car-

tilages occlusion of the joint surfaces and reactive joint proliferation. However Beintker believes that in the iron industry the material is harder and the recoil is more forceful and for these reasons many joint injuries are certain to occur. But this is not the case. It is a fact that in the coal mining the chiseling does not offer a solid resistance but more often drives ahead and the arm follows through which causes a tear of the joint capsule. Beintker understands the true condition.

Röntgenologically one finds ossification of the calcium deposits in the capsule around the joints of the upper arms and there is a widening of the head of the radius and hypertrophic changes of the coracoid process of the ulna. Such changes exist and the guild will not recognize a claim for this disability of less than two years duration. The bone of the hand which may become involved are either the semilunar bone or the ulna lying up the other joint. This condition is termed Lunatum-luxation. The common site of injury is the shoulder joint which was involved in only 14 per cent of the cases. The shoulder joint is most distant from the source of the concussion and will therefore receive only a minimum impact. Röntgen J. B. Vert J. M.D.

Mascheroni H. A. and Reu I. C. Fluorine Osteosis (Osteitis fluoras). Röntgen J. B. Vert J. M.D. 1941 9 47

Fluorine osteosis is a disease of the bones and teeth caused by the ingestion of excessive amounts of fluorine, usually in the drinking water. A survey was made of Argentina and a map is given showing the areas in which this disease is found. An analysis of the bones in the first five cases published in that country showed 0.750 gm per 1000 of fluorine in the bone ash. It has become a serious sanitary problem. In some of the regions investigated there was as much as 100 mg per liter of fluorine in the water and the drinking of this water in childhood causes serious injury of the teeth and bones.

Three cases are described and illustrated with roentgenograms and photomicrographs. The first was in a young woman of twenty three years in whom the bone lesions were unusually severe probably because of the fact that there was an unusual accumulation of fluorine in the tissues. She had poor kidney function which was detected by a test of the excretion of the bladder and reterhydronephrosis. The second was in a woman of forty two years and the third in a woman of twenty eight years. In all three cases a study was made of the family and of the neighborhood to see whether there were other cases. The water supply of the neighborhood was investigated to see whether the fluorine content was too high. All of the patients showed changes in the teeth respiratory hang with decreased alveolar capacity changes in the blood consisting of a slight normocytosis and

normochromic regenerative anemia, and in one of the cases a leucemoid reaction. They also had headaches, a slight increase of calcium in the blood, and bone changes consisting of pain, kyphosis, decreased excursion of the chest wall, hyperproduction of bone with exostoses, increased density of the bones and osteoporosis, thickening of the cortex, disappearance of the trabeculae, and zones of reabsorption of bone with increased fluorine content of the bones.

AUDREY G. MORGAN, M.D.

Korniev, P. G. The Role of Orthopedic Measures in the Treatment of Articular Tuberculosis
Vestnik khir., 1940, 60, 405

A proper treatment of osseous articular tuberculosis consists of a combination of orthopedic measures and general therapy.

Methods activating the specific process by hyperemia did not yield good results and should be replaced by immobilization of the involved extremity. Plaster-of-Paris casts and extension supplement each other. The functional result depends not so much on the methods employed as on the character of the destructive process. On one hand, a cast does not guarantee the formation of ankylosis and, on the other, continuous extension and limited motions are not always able to preserve the mobility of the involved articulation.

Extension is most useful in recent, incipient cases of coxitis or gonitis, correcting myogenic contractions and replacing immobilization while a change of the casts is being made.

During the period of acute pains and development of complications, a circular cast should be applied. In other stages plaster-of-Paris splints are preferable because they do not interfere with physical therapeutic and surgical measures. Fenestrated circular casts are recommended if an aspiration of the pus is contemplated.

JOSEPH K. NARAT, M.D.

Colombani, S. The Frequency of Complications of the Urinary System in Patients with Osteo-Articular Tuberculosis (Sulla frequenza delle complicazioni dell'apparato urinario negli ammalati di tubercolosi osteo articolare) *Chir. d'organi di movimento*, 1940, 26, 175

Colombani found that of a total of 1,328 patients having osteo-articular tuberculosis, observed from 1923 to 1939 at the Heliotherapeutic Institute of Codivilla, 224 or 16.87 per cent, had a disease of the urinary system. Among these, 71, or 31.69 per cent (5.35 per cent of all the cases), had renal tuberculosis, 59, or 26.34 per cent (4.44 per cent of all the cases), had degenerative renal disease, 12, or 5.36 per cent (0.90 per cent of all the cases), had symptoms suggesting renal tuberculosis which, however, could not be diagnosed, 24, or 10.72 per cent (1.50 per cent of all the cases), had disorders of the urinary system of long standing which did not allow the diagnosis of tuberculosis of the kidney or of some other part of the system, but suggested it, 58, or 25.89 per cent (4.37 per cent of all the cases),

had temporary disorders of the kidneys or of the urinary passages.

In a patient with osteo-articular tuberculosis, any disease of the urinary system which has persisted for a long time and is refractory to medical and dietary treatment aggravates the prognosis notably and raises the suspicion of renal tuberculosis. The statistics of the Institute show a mortality of 3 or per cent for renal tuberculosis in subjects having osteo-articular tuberculosis. If the aggravated (0.90 per cent) and the stationary (0.37 per cent) cases were taken into account, this percentage would increase to 4.28. Renal tuberculosis may occur in any stage of the disease of the bone when the general or local defense powers are decreased, and it always makes the prognosis unfavorable if timely surgical treatment is not instituted. Often surgical treatment is made impossible by the serious general condition of the patient or by the bilaterality of the renal lesion. Renal tuberculosis generally attacks those who are already debilitated, but its occurrence is not due to the gravity of the osseous disease, in 90.14 per cent of the cases, it appeared after the beginning of the osteo-articular lesion.

A decided predominance of the male sex, and of lumbar spondylitis has been noted among the patients who have diseases of the urinary system with osteo-articular tuberculosis, and most frequently these patients are in the third decade of life. The renal degenerative diseases (nephrosis, amyloidosis) have always been found in patients suffering from long-standing suppurative processes, and their presence greatly aggravates the prognosis because they are an expression of the gravity of the general condition of the patient. The mortality of these patients amounts to 2.10 per cent, and the percentage of the aggravated (0.83) and of the stationary (0.15) cases, of which the prognosis is always unfavorable, would increase the mortality to 3.08 per cent. The nephrosis nearly always continues its course even if the bone disease heals.

Of the 224 patients with disease of the urinary system, 76, or 5.73 per cent, have died, in 29, or 2.18 per cent, the condition is aggravated, in 13, or 0.98 per cent, it has remained stationary, in 37, or 2.78 per cent, it has improved, in 11, or 0.83 per cent, it is cured, and in 58, or 4.37 per cent there seem to have been only temporary disorders which, in general, have not interfered with the course of the osteo-articular disease. The aggravated and the stationary conditions of patients who have a disease of the urinary system have always led to an unfavorable prognosis.

There seems to be little probability that a tuberculous process can spread by contiguity from the psoas abscess to the kidney. In every patient with osteo-articular tuberculosis it is necessary to make a systematic examination of the urinary system, because this investigation has the same importance as that of the respiratory system. Cultural and biological study of the urinary sediment is indicated in every case in which pathological elements are present.

in the urine and in which even the slightest disturbance is found in the renal function. Only by such studies will it be possible to diagnose and cure renal tuberculosis.

RICHARD KEMEL, M.D.

Belgrano V. Experimental Research on the Osteogenesis by the Vesical Mucosa in the Repair of Bones (Ricerche sperimentali sull'osteogenesi da mucosa vescicale nelle riparazioni dello scheletro). *P. I. del R. me. 1941, 48, sez. ch. 89.*

A review of the literature shows that the conclusions of the various authors still disagree on the osteogenic property of the epithelium of the organs of the urinary tract, some accept as very frequent the formation of bone tissue following transplantation of the mucosa of the bladder while others without completely denying this possibility claim that it is rather inconstant. This disagreement is due to the animal used for the experiments or to the tissue or organ in which the graft has been inserted. Rabbits have given a large number of negative results while dogs have in general given positive results. Insertion of grafts of the vesical mucosa into muscular tissue, the spleen, or gaps in the bone has given positive results which were particularly constant in the muscular tissue.

Belgrano conducted his experiments on 16 dogs using 3 animals as controls. Through a subumbilical median laparotomy he externalized the bladder and resected from its roof a small lozenge the size of a quarter and involving the entire thickness of the wall of the organ. He placed the specimen in a sterile physiological salt solution with a temperature of 37° C. and sutured the bladder. Then he exposed the middle third of the tibia, elevated the periosteum, made a trephine opening in the bone and enlarged the opening by means of a bone resecting forceps. He scooped out the marrow and after having carefully removed the mucosa only from the bladder specimen deposited it into the cavity and closed the wound.

The results were not as good as those obtained by some other authors. The small number of positive results is to be attributed to the facility with which suppuration occurs in the wound and to consequent elimination of the graft as a foreign body. The changes which took place in the transplanted tissue and its vicinity were followed up for a period varying between twenty-two and sixty-six days. In 3 cases in which there had been no suppuration the focus of insertion of the graft histological examination twenty-two, thirty-five and sixty-six days respectively after the operation showed no trace of the bladder epithelium but strong proliferation of the connective tissue. In 4 cases histological examination twenty-four, thirty-three, forty-four and fifty-nine days respectively after the intervention revealed the presence of epithelial cells in various stages of regression and differentiation. In 2 of these cases it was possible to observe the final evolution of the graft or rather of the connective tissue which had replaced it. The young connective tissue ele-

ments were surrounded by an amorphous substance and assumed peculiar staining properties. The nuclei became larger and less numerous and presented darker thin fibrils which radiated toward the periphery and assumed an irregular stellate form. The histological aspect of the cells was thus morphologically rather similar to that of bone tissue. No cystic cavities were observed during the process of osseous metaplasia. The histological findings were in part confirmed by roentgen examination which showed more rapid repair of the bone lesion in the animals in which the graft had been inserted than in the controls.

The author draws the following conclusions from his experiments:

1. Following a homologous graft of vesical epithelium into the medullary canal of a long bone, the dog, there is a new formation of connective tissue which surrounds the graft and replaces it.

2. In rare cases there is a metaplasia of the connective tissue into bone tissue.

3. This process is not constant because the connective tissue in most cases changes into fibrous tissue.

RICHARD KEMEL, M.D.

Liberti V. Segmental Bone Regeneration with Heteroplastic Graft (Rigenerazione segmentaria omogenea da tessuto eteroplastico). *Ch. 1940, 9, 389.*

Liberti prepared his heteroplastic grafts from the spongy portion of bones of oxen (vertebral body lower extremity of the femur) after prolonged boiling and subsequent drying in the open air. The graft 2 cm. long were cut to the thickness of the tibia of rabbits and the extremities were either reduced to allow them to fit into the medullary canal of this tibia. With the intention of creating conditions favorable to the taking of the grafts he saturated them with physiological salt solution homogenous cetrated blood. 2 per cent oily solution of cholesterol or this cholesterol solution mixed with homogenous blood. He excised portions of the tibia of rabbits preserving as much as possible the periosteum and the fibula and installed the grafts which he then covered with the remnants of periosteum. The legs of the animals were immobilized in plaster cast and the animals were kept under observation for two months.

The grafts treated with physiological salt solution or with blood of the hosts gave unfavorable results at least for the time during which the observation lasted. They were found to be softened and decayed and the parosteal tissues showed no reactions which would be sufficient from the osteogenic point of view to lead to replacement of the graft and to repair of the missing portion of the tibia. On the other hand the grafts treated with cholesterol solution alone mixed with homogenous blood gave satisfactory results macroscopically. There was no discontinuity of the tibia and histologically the trabeculae of the spongy graft were gradually resorbed and replaced by the formation of a special

parosteal and periosteal osteogenetic tissue rich in osteoclasts. Complete replacement of the graft and complete ossification of the reactive tissue were not observed because the period of survival of the animals was not long enough to allow termination of the process. In fact, other authors who have studied the question state that completion of the process takes several months and even years, in the present experiments, it was impossible to keep such weak animals as rabbits in a plaster cast, no matter how light, for more than two months. It is impossible to state what part cholesterol plays in the mechanism of the reactive and regressive processes. Authors who have introduced cholesterol directly into the focus of a fracture and have obtained more rapid formation and greater strength of the bony callus attribute to the substance a special property which manifests itself by greater deposition and fixation of calcium. Liberti thinks that, in addition, cholesterol possesses a marked stimulating power on all the osteogenetic reactive processes which result in the substitution of the graft by new bone. The homogenous blood is of no special help in this process as it has remained without appreciable action when used alone.

RICHARD KEMEL, M D

Jacobson, S A Critique on the Interrelationships of the Osteogenic Tumors *Am J Cancer*, 1940, 40 375

The author presents a comprehensive review and study of the interrelationship of tumors of the skeletal tissues and places it on a simple logical basis.

The scheme of the classification developed by the writer is shown below.

A detailed discussion of the literature on the various types of skeletal tumors follows, and is accompanied by the author's comments and conclusions pertaining to the phylogenesis of these lesions.

DANIEL H. LEVINTHAL, M D

Bosworth, B M Calcium Deposits in the Shoulder and Subacromial Bursitis, A Survey of 12,122 Shoulders *J Am M Ass*, 1941, 116 2477

Six thousand and sixty-one unselected persons were subjected to physical and fluoroscopic examination of both shoulders. Of the whole group, 165 (2.7 per cent) were found to have calcium in sufficient amount to show up on fluoroscopy in one or both shoulders. The incidence of calcium formation was exactly the same in the employee and the non-employee groups.

Multiple deposits occurred in 20.3 per cent of the involved shoulders. Calcium appeared subsequent to negative fluoroscopic examination in 29 (14.4 per cent) of the 202 shoulders showing deposits. Although calcium has often been observed to regress, with or without treatment, it entirely disappeared in only 13 shoulders. Nine of the 13 presented symptoms. In 2 no treatment of any kind was given and in 2 others the deposit was removed surgically. In 5 the deposit disappeared coincidentally with baking or diathermy. In the remaining 4 in which the calcium disappeared, there were never any symptoms nor was any treatment given.

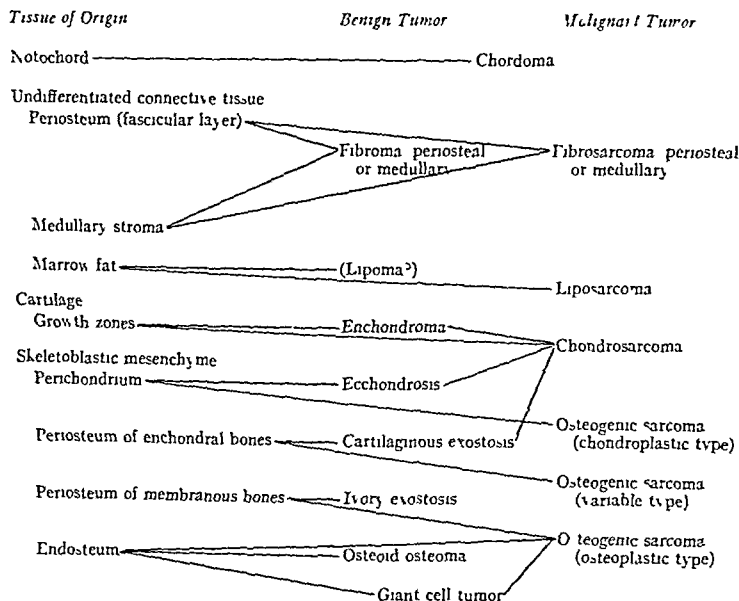


Fig 1 Tumors of Undifferentiated Connective Tissue

Seventy (34.6 per cent) of the involved shoulders caused some degree of pain either prior to or during the period of observation. Twenty (10 per cent) gave rise to symptom for the first time subsequent to the discovery of the calcium on fluoroscopic examination. The size of the deposit in general was in proportion with the symptoms complained of. Yet one third of the large deposits gave rise to no complaints whatever while under observation.

This condition is sometimes self limited and self curative. As many as from 60 to 80 diathermy treatments were given to a single shoulder over a period of from six to eight months and in at least 2 instances with little or no relief. Frequently an acute attack was precipitated or a somewhat painful shoulder made worse by the application of heat. The author believes that the best treatment for the acute attack is prompt excision of the deposit under local or general anesthesia through a small incision. It is said to give immediate, certain and complete relief. The average hospital stay was four days and regular duties were resumed in three weeks. Immobilization of the shoulder is mentioned only to be condemned because of danger of the formation of adhesions. Large deposits should be excised regardless of symptom to forestall the development of an acute attack of bursitis. Medial and tin deposits should in general be treated conservatively and should be watched. Calcium deposits occur most commonly among males. Serious illness, arthritis, rheumatism and infection whether local or systemic past or present are said to exert no influence on the formation or regression of the deposits. Occupation which requires constant prolonged abduction of the arms are said to promote the formation of the calcium deposits in the shoulder.

RICHARD J. BEVETT, JR., M.D.

Holmberg L. Septic Spondylitis. A Report of 7 Cases. *Acta Orthop Scand* 1941 54: 479

Holmberg describes 7 cases of septic spondylitis caused by staphylococci or by streptococci and of probable influenzal origin. The pathogenesis is discussed as well as the relation to trauma. The author believes that trauma is not of pathological significance.

Septic spondylitis is a rare disease with a high mortality and morbidity caused by the same or gangrenous is possible for osteomyelitis. It is observed more frequently than women and involves the thoracic and lumbar segments of the spine.

In 4 of the cases reported the vertebral bodies in the same region were affected in a case of vertebral body in the cervical area and 2 cases of the thoracic and vertebral bodies in different areas. In the 4 cases occur in 6 of the 7 cases. The roentgen rays are of value in early cases and they demonstrate abscesses, shadows and edema. Differential diagnosis must be made chiefly from tuberculous spondylitis. Treatment consists of early incision and drainage followed by immobilization. J. M. McRA, M.D.

D'Alata F. Function in Ankylosis of The Hip Joint. (*Dramb l'azion d'anchi i dell'anca*). *Chirurgia* 1940 6: 5

The author studied the hip joint with x-rays and motion picture films. In normal motion with integrity of the joint there is a flexion-extension movement of 25 degrees while in ankylosis of the hip joint there is a compensatory oscillation of the pelvis of 25 degrees about two axes: one in a frontal plane through the lumbosacral articulation and the other through the well joint. The muscles which move the pelvis are the abdominal muscle, the lumbosacral and the flexors and extensors of the hip joint. The well hip is thus subject to extra work. When there is a flexion ankylosis of the hip joint there is a downward tilt of the pelvis. The author proposes the use of the Roser-Nelson line as a standard. A favorable position of ankylosis would be a 50-degree angle with the Roser-Nelson line. A greater angle would be good for standing but would not be effective in walking. Ankylosis in adduction, abduction and internal and external rotation is unfavorable and should be corrected. JACOB E. KLEIN, M.D.

Gul L. Anatomical Study in a Case of Pseudarthrosis of the Femoral Neck Cured by Inter-trochanteric Osteotomy. (*Stud. anat. m. os. un caso di pseud. art. os. fem. coll. f. m. le cu. to con lo t. otom. int. t. nt. t. a*). *Chirurgia* 1940 6: 137

Gul describes the histological observations made in a case of pseudarthrosis of the femoral neck and shows that the callus of metaphyseal origin progresses upward until it reached and passed through the line of fracture. The abundant formation of this callus was astonishing in a woman aged seventy-three years. In the part which unites the diaphysis to the trochanteric fragment as well as at the site where it passes through the line of fracture the callus was composed nearly exclusively of osteoid and osseous tissue with only rare traces of cartilaginous callus which however was rather abundant at the line of pseudarthrosis and especially its upper part. The anatomical findings were of great interest because they show that the upper extremity of the femur possesses great capacity for repair even in old people and under very unfavorable conditions (prolonged immobilization before the intervention). Lack of consolidation does not mean that all capacity for local repair is exhausted. Many cases it is only held back by the complexity of local conditions created by the fracture itself and aggravated by rotation of the fragments. The difficulty is to wake up the reparative powers which the bone still possesses. This should be done with treatment that is not given up too soon. On the other hand it is necessary to avoid the opposite pitfall of treating the pseudarthrosis as a recent fracture.

The thorough knowledge of all the phenomena which accompany fracture of the femoral neck and of the anatomical changes present in an old fracture has led to the intertrochanteric osteotomy of Putti-

which, to the eye of the casual observer, may seem to be related to that of Lorenz-Hass, but has really little in common with it. According to the German authors, the osteotomized diaphysis has the simple duty of supporting the epiphysis consolidation between the diaphysis and epiphysis and, much less, the healing of the fracture are not expected from the intervention. In fact, Hass performs his osteotomy in non-reduced fractures with practically regular interposition of the capsule. This is never the case in intertrochanteric osteotomy. Putti's operation is not a palliative intervention to be used in cases in which there is nothing better to do, it is a reconstructive operation based on the principles of treatment of retarded consolidation: strict immobilization of the focus of fracture obtained by a change in architecture of the upper portion of the femur, supply of bone forming material, and opening of the marrow spaces of the metaphysis which is brought in contact with or in the vicinity of the line of pseudarthrosis.

RICHARD KEMEL, M D

DeFine Licht, E Bipartite Os Naviculare Pedis *Acta radiol*, 1941, 22 377

The term bipartite os naviculare pedis is used to describe a lesion diagnosed only roentgenologically. A dorsoplantar view reveals a wedge-shaped alteration of the bone, with the base of the wedge directed medially. Lateral to the point of the wedge is a triangular shadow which is located dorsally and appears in the lateral view to be separated from the remainder of the navicular bone. The lesion may be unilateral or bilateral and is probably of congenital origin. It must be differentiated from tabes dorsalis and fracture. Pain on standing and limitation of motion are to be expected symptomatically.

The author reports 4 cases, all of which also showed arthrotic changes in the affected joints. He could find only 7 other cases previously reported, all in the literature of continental Europe.

CHESTER C GUY, M D

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC

Farill, J Arthrodesis in Tuberculous Coxitis (El tratamiento artrodesiante en la coxitis tuberculosa) *Gac med de Mexico*, 1941, 71 172

Arthrodeses were performed on 31 cases of tuberculous coxitis, the operation being done twice in 1 case. Eight were intra-articular operations and the remainder were periarticular, 3 by the method of Sorrel, 2 by that of Hass, 1 by that of Ghormley, and 18 cases by that of Farill himself.

In marked cases of deformity an arthroclasia or a subtrochanteric osteotomy preceded or followed the arthrodesis. Conservative methods were invariably tried first, until the inflammatory process became quiescent. The inflammation often disappeared after prolonged rest in bed (from two months to two years) and, in case of pains and muscular spasm, following traction with a weight. The affected limb

was then placed in a plaster-of-Paris cast, fixed in a position of slight flexion and slight abduction. From three to four weeks later, an arthrodesis was performed through an elliptical space cut in the plaster cast over the trochanteric region. The plaster cast was removed two months after the operation and the patient allowed to take the first steps. In the author's method, a prismatic bone peg, dissected from the tibia, was implanted in a tunnel drilled from the subtrochanteric fossa to the base of the acetabular cavity, at the union point with the iliac wings.

Farill claims the following advantages:

- 1 Utilization of a bone peg taken at a distance from the tuberculous focus and therefore certainly immune from the disease.

- 2 The best mechanical conditions for the bone peg implantation in the trabecular system running from the base of the great trochanter to the head of the femur.

- 3 Ample contact between the implanted bone and the femur-iliac tunnel.

- 4 Simplicity and rapidity of execution, without hemorrhage and surgical shock.

- 5 Prevention of any fracture or dislocation of the implanted bone, because the operation is performed without removal of the plaster cast.

As for the results, of 18 patients operated upon by Farill's method, only 14 were followed up for more than one year. One patient died of amyloidosis twenty-five months later. In 12 cases a bony ankylosis was obtained (50 per cent intra-articular, 50 per cent periarticular). In 1 case only, a fibrous ankylosis followed. There was no operative mortality and no postoperative complications developed.

Fracture, dislocation or total reabsorption of the transplanted bone, or a secondary pseudarthrosis were registered in contrast to the results of other operative methods. EMANUELE MOMIGLIANO, M D

Horeysek, L Results of Curved Resection After the Method of Helfferich for Tuberculosis of the Knee Joint of the Adult (Ergebnisse der bogenfoermigen Resektion nach Helfferich bei der Kniegelenkstuberkulose Erwachsener) *Ztschr f Orthop*, 1941, 71 317

Horeysek believes that necrosis can be eliminated in the treatment of joint tuberculosis. The conservative procedure which is the method of choice in children is of value also for adults when local and general treatment are possible under the most suitable conditions and if "discharge fixation, nutrition, medication, puncturing and injection combine to give a satisfactory result." This seldom occurs. Early operation is therefore indicated in cases when they are not treated for tubercular hydrops, and in adults over fifteen years of age it gives excellent results and does away with long protracted conservative treatment and suffering. Among 25 patients with tuberculous inflammation of the knee joint there was a total of one hundred and forty-six years of conservative therapy without satisfactory results.

The location of the fracture in the cervico-trachanteric region is a favorable site for circulatory drainage and a more recovery. A summary of the group of cases with regard to location of the fracture was 8 of the cervico-trachanteric type and 4 of the mid-cervical type. Each of the latter 4 cases had some complicating factor relating to the injury. The authors believe that the type of fracture is cervico-trachanteric in 75 per cent of the cases and also that skeletal fixation in plaster may be substituted if reduction in delayed reduction adductor tenotomy may be necessary, in cases seen later in the case (after 4 weeks) union should be permitted and then the firmity should be corrected by osteotomy. There is aseptic necrosis may supervene if the damage from aseptic necrosis is a little greater without weight bearing should be allowed.

Results of the various methods employed for reduction and maintenance are noted. A résumé of the results with 12 fractures of the femur is given. Several illustrations of roentgenograms are reproduced. Reports in the literature should substantiate the conclusion that cervico-trachanteric fractures in children are not satisfactorily reduced and maintained in reduction by the method which has been usually employed in the treatment of fractures in adults.

Wm. C. ROBINSON, M.D.

Logghe, D.: Fracture of the Tiltal Spine in a Kier (Le trait de la tige tillaire et de la tige tillaire). *Chirurgie* 1940, 1, 940-1, 945.

Fracture of the tillaire spine in a Kier is not infrequently met but other types of trauma are of greater frequency and the mechanism which causes it. It occurs especially in the knee which have suffered a severe trauma with a fracture of the medial collateral ligament. The Kier presents particularly favorable conditions for the reduction of this fracture because of the greater leverage of the knee. If atrophy which is due to atrophy of the rapid change in direction is fully executed the result may be similar tearing of the medial collateral ligament or fracture of the tillaire spine. In many cases the patient is able to fall while gliding downhill in this position the legs are in motion. If in 40 to 60 degrees and in internal rotation of about 30 degrees with a slight lateral rotation. The medial collateral and the anterior cruciate ligaments are therefore in strong tension. If the knee falls forward and to the outside the medial ligament may snap and the tillaire spine break. This is what occurred in a case which Logghe has reported. In the fifth case the Kier ran into a tree while having a ligamentous fracture of the thigh.

The physical diagnosis of fracture of the tillaire spine is impossible because there is no absolute physical signs. The roentgenogram is needed to confirm the diagnosis. It may be real a fracture of the spine and in the knee was in a favorable position for fracture at the moment of the

accident. If the patient, on trying to get up, had rather severe pain and found his knee unworkable, sometimes 2 more than a severe tearing of the ligament should be suspected, because the latter does not cause such severe symptoms. Effusion in the joint appears in from two to thirty minutes. Limitation of extension of the knee is a probable sign of the fracture. In 2 of the present cases there was irreducible extension of the knee associated with valsalva in a case. The whole point is painful. A peculiarity of the strongly hemorrhagic effusion is that its surface presents small spots of fatty fluid which suggest something more than simple tearing of a ligament.

The treatment is conservative and should be applied early to insure good results. Under local anesthesia of the soft tissues the joint is emptied by puncture and 15 c.c. of a 2 per cent novocaine solution are introduced. The fault position of the leg is corrected by manipulation and a traction of the knee is immobilized in moderate extension by means of a plaster cast reaching from the top of the thigh to the toes. Walking and weight bearing are allowed after two weeks. In severe cases requiring careful supervision for the first days a posterior plaster splint and an icebag on the knee are used and the full plaster cast is applied after from seven to ten days. According to the cases the cast is cut in halves from the thigh to the fifth day and careful mobilization is started. Therapeutic is used until complete functional recovery from 30 to 30 sittings are needed. In inveterate or neglected cases surgical treatment may become necessary.

RICHARD KEMEL, M.D.

ORTHOPEDICS IN GENERAL

Gall, W. E. The Experience of the Canadian Army and Penion Board with Amputations of the Lower Extremity. *Surgery* 1941, 1, 925.

This report deals with the conclusion based on the experience with 2,418 amputations of the lower extremity over a period of twenty-five years. Four types of amputation are discussed and all others are mentioned in fact.

Syme amputation when properly done is the best. The result is better than that of the hip flap and the result is firmly secured by adhesion of the flap. Two weeks postoperatively the patient is in the battle line or where there is risk of infection. The mobility of the flap is questionable. May be useful in the Syme amputation can be performed at the level without the orthopedic amputation. Artificial limb makes it unnecessary to limit the Syme operation because it is difficult to fit a prosthesis to the stump and the symmetry of the leg is not restored. The latter objection is valid for women only. The correct technique must be mastered.

Most amputations are generally unsatisfactory. The stump should never be more than 6 in. long. The fibula must be cut short or removed altogether and

the skin must fit the end of the stump evenly. A conical shaped stump is the best. The best of these stumps will not prove satisfactory in those who have to stand at work and most of them should be reamputated and converted into the Gritti-Stokes type of end-bearing "above-knee" limb. Even those patients who lead sedentary lives are often found to complain that they cannot get a satisfactory prosthesis.

The Gritti-Stokes amputation is preferable to the mid-leg or mid-thigh type because of the advantages offered by an end-bearing stump. Troublesome Gritti-Stokes cases are generally due to improper anchorage of the patella to the femur or failure of union. Reamputation with steel wire for fixation is then indicated. If these stumps will not tolerate constant hard standing, the short thigh corset may be replaced by a bucket allowing the weight to be

carried, to a partial extent at least, on the ischium.

The mid-thigh amputation is indicated when life is in jeopardy or one of the other types is not indicated. One should not criticize a surgeon for a poor stump unless one knows the circumstances under which the operation was performed.

In the discussion of this paper A. B. LEMESURIER of Canada also praised the Syme's amputation. LEO ELOESSER of San Francisco believes the Syme's stump superior to all others. Many mid-leg stumps can be made end-bearing if the tibial condyles are properly padded so that they do not slip up and down in the prosthesis. Colonel N. T. Kirk of the United States Army also praised the Syme's stump and stated that the Canadians have developed an excellent type of prosthesis to fit them.

CHESTER C. GUY, M.D.

hemolysis present. Intravenous injection of a large amount of incompletely hemolyzed blood may produce a severe and even fatal reaction. Although the concentration of hemoglobin in the plasma necessary to produce toxic effects is not known, it is agreed that the injection of an amount sufficient to produce hemoglobinuria is undesirable. It is known that the behavior of erythrocytes during storage is influenced by the constituents of the anticoagulant solution and by the degree of dilution of the blood.

In summarizing the authors state that a study of the effect of storage upon the erythrocytes in blood mixed with 3.8 per cent sodium citrate to give a final concentration of citrate of approximately 0.38 per cent has revealed the following changes:

1. A gradual fall in the erythrocyte count begins immediately when the blood is stored. The curve relating erythrocyte count to length of storage is asymptotic; the reduction in the count is greater in the earlier weeks of storage. Considerable variation as, however, found between one blood and another. The magnitude of the fall and also the percentage fall are dependent on the initial erythrocyte count, being greater with higher counts. It cannot be definitely stated that the progressive fall in erythrocyte count is entirely due to rupture of cells, since ghost corpuscles are found in stained films. Such dehemoglobinized cells would not normally be enumerated in the erythrocyte count.

2. The progressively altering relationship between the total hemoglobin content and the erythrocyte count is indicated by changes in the color index which are subject to ever marked variation between one blood and another.

3. There is an initial increase in corpuscular volume during the first twenty to thirty-five days of storage. This more than compensates for the fall in erythrocyte count during this period. Thereafter the corpuscular volume remains constant for at least ten to twenty days. The increase in corpuscular volume is due to the gradual development of spherocytosis. It occurs in the presence of a hypotonic solution outside of the cell envelope taken together with the properties of the cell envelope alter on the volume index and the mean corpuscular volume.

4. The volume index and the mean corpuscular volume show a steady increase from the first day of storage. The volume index exceeds unity within the first two weeks of storage and the mean corpuscular volume exceeds the upper limit of normal within the first fifteen days. The changes suggest that the erythrocyte are becoming more spheroidal during storage.

5. The gradual development of spherocytosis is confirmed by determinations of the corpuscular diameters, mean corpuscular average thickness and diameter thickness ratio. The time taken to attain the spheroidal state varies from about three to ten days.

6. The erythrocytes attain the spheroidal state at approximately the same rate as anisocytosis does

not develop during the process. After the twentieth or twenty-fifth day of storage all the spheroidal cells are of virtually the same size.

7. Photomicrographs reveal the altered appearance of the erythrocyte, which seem to be smaller although their volume is actually increased.

In concluding the authors state that there can be no doubt that the development of the spheroidal state is closely associated with an increased fragility both to mechanical and osmotic influences.

HERBERT T. TRAUSTON, M.D.

Erland, L.D. and Behrend, M. The Tranfusion of Preserved Blood Plasma (U.S. Army Medical Department, Washington, D.C., 1941, p. 418)

Formerly infusions of 0.9 per cent sodium chloride solution alone or with the addition of gum arabic were used successfully at the University Surgical Clinic at Groningen in cases of postoperative shock. However, there were also cases of postoperative collapse (4 cases) following operations on the lung, kidney and prostate gland and bone transplantation, in which sodium chloride infusion as well as restoration of the blood pressure was achieved only by the injection of blood plasma. The Netherlands Red Cross established depots for the deposit of blood plasma which was produced according to the procedure of De Vries. However, the plasma contains also some red blood corpuscles and therefore is not indefinitely permanent. During the Spanish War the Germans taught that not the red blood corpuscle but the plasma is of decisive importance for the survival of the individual.

The plasma of the Blood Group AB is borne well by everybody. The blood plasma is obtained from 500 to 600 cc of plasma the same effect is achieved as with much greater amounts of blood. In the preparation of the plasma the procedure must be carried out under bacteriological control in an absolutely sterile manner with sterile clothing as in an operation and also with exclusion of air infection and the blood must be taken with a boiled puncture cannula. This cannula is washed through with an ethereal paraffin solution (paraffin with a melting point of 45 degrees) and connected by a glass flask made of Jena glass supplied with a tube on the side. This flask is supplied with a graduated glass ampul for the escape of air and bears a stopcock on the ampul which may be closed with a cork for the antiseptic preparation of the ampul. The sodium citrate solution should be prepared fresh each time and the citrate solution should be distilled water with 1 liter of 0.5 gm of sodium chloride and 0.2 gm of sodium citrate 0.5 gm of sodium chloride and 0.2 gm of sodium citrate. Before the taking of the blood which should be taken from a fasting donor the floor of the flask should be covered with citrate solution. Altogether the authors draw 300 cc of blood and mix this with

a little shaking with 260 c cm of the citrate solution. Then 10 additional c cm of blood are taken for the Wassermann reaction. The blood mixture is drawn off with a sterile water pump and filled into 4 sterile glass cylinders of 150 to 175 c cm, which are closed with sterile aluminum caps. The 4 cylinders are then centrifugalized for thirty-five minutes (about 3200 revolutions), and with the aid of the water pump the plasma is transferred into the pointed plasma ampules with careful avoidance of air bubbles. After the transfer the pointed ends are melted together. The plasma (1 c cm) from the cylinder is sent for bacteriological examination. In order to avoid an infection, the plasma ampules are supplied before the mixing with a few drops of superol solution (1:1,000), and for every 50 c cm of plasma 1 drop of superol solution is used. After the closure by melting the ends, the plasma ampules are placed into an incubator for three days for testing and, if no infection follows, they are enclosed in black paper and preserved in the upright position in an ice-box at 4° C. Every ampule is supplied with the date of the taking of the blood, the name of the donor, the blood group, and the amount of the plasma. The extremely important cleansing of the glassware is done according to the directions of De Vries.

After 27 tests made in this way, some of the ampules remained sterile and useful up to seven months. Before it is used, the ampule is placed for half an hour in warm water of 40 to 42 degrees. In this way, most of the flocculi floating in the plasma disappear, the remaining flocculi consisting of fibri-

nogen and blood platelets are filtered off through sterile gauze. Ampules that have been warmed once should not be used again. For a blood transfusion, 2 or 3 ampules are necessary, the content of which should be injected into the circulation of the patient at a rapidity of from 5 to 10 c cm per minute. No harmful results have been observed.

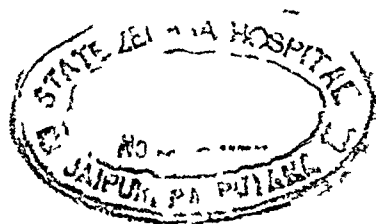
(DUNCKER) LOUIS NEUWELT, M D

Rose, B, Weil, P G, and Browne, J S L. On the Use of Concentrated Pooled Human Serum and Pooled Lyophile Serum in the Treatment of Shock. *Canadian M Ass J*, 1941, 44 442

The effectiveness of two types of pooled human serum was studied. One preparation was made by placing serum in collodion membranes and concentrating it to approximately one-third of the original volume, the other "lyophile" preparation was made from serum that had been evaporated to dryness from the frozen state. Thirteen patients, of whom 5 were in shock, were treated with the concentrated serum, and another patient was given concentrated typed serum. Reactions were observed in 5, or 35 per cent, of the cases, and death followed in 2 of them. In 7 of the 9 cases in which no reaction occurred, the results of serum therapy were beneficial.

This type of serum was considered contraindicated in the treatment of shock because of the frequency and nature of the reactions observed. Sixteen patients, not in shock, received transfusions of lyophile serum and no severe reactions were noted.

WALTER H NADLER, M D



SURGICAL TECHNIQUE

WAR SURGERY

Jordan E. P. and Halperin G. Tetanus Toxoid for Prophylaxis *W. J. Med. & Surg.* 1941 1: 227

The desirability of active immunization against tetanus is generally recognized. The evidence indicates that a considerable amount of time is required before adequate active immunity can be established with toxoid and any program in order to be effective must be initiated a considerable time before exposure is likely to occur.

Since the introduction of formaldehyde treated toxin or toxoid by Ramon and his colleagues (about 1973) a vast amount of work has been done to determine the best preparation to employ and the preferred method of immunization. Although no international standard for tetanus toxoid has been adopted little variation has appeared to result from its preparation as practiced in various parts of the world.

According to the present consensus alum precipitated toxoid, the preferred preparation, two doses of 1 cc each given from one to six months apart generally produce good primary immunity. After several months a third or boosting dose results in rapid stimulation of antitoxin production with consequent high relative immunity.

Although the value of this technique has been confirmed by laboratory determinations on the level of serum antitoxin in human beings and in animals the most important available clinical test of the effectiveness of tetanus toxoid was provided by the evacuation of Dunkirk. Many men arrived in Britain five or six days after being wounded with untreated wounds. Among the small percentage who were unprotected by immunization, tetanus occurred in 8 while among the large proportion of patients who were actively immunized tetanus did not develop in a single case.

It is also found practical to combine tetanus toxoid with diphtheria toxoid or with typhoid and paratyphoid vaccine when immunization against these other diseases is indicated.

Children can be routinely immunized with tetanus toxoid and diphtheria toxoid and there appears to be no evidence which would tend to contraindicate this procedure.

There has been immunization with tetanus toxoid alone or in combination with other substances of millions of persons (the exact number cannot be determined) and it has been found to be as effective with only rare reactions. It is the consensus of opinion that all military personnel and all others in the cases of all military personnel and all others whose occupation places them in position of special liability to tetanus infection.

GEORGE A. COLLETT, M.D.

Rhoads J. E. Wolff W. A. and Lee W. E. The Use of Adrenocortical Extract in the Treatment of Traumatic Shock of Burns *A. S. S. J.* 1941 113: 955

There is little evidence to indicate that adrenocortical extract increases the plasma volume per se. No striking recovery of plasma volume was found unless large amounts of plasma were administered. Apparently adrenocortical extract reduces the permeability of the damaged capillaries and thereby enables the vascular compartment to retain a large proportion of the plasma protein placed in it by transfusion. In both man and animals the beneficial effect of adrenocortical extract is most striking when it is given simultaneously with an adequate transfusion.

Adrenocortical extract is recommended in the treatment of patients with extensive burns.

1. To reduce the amount of plasma required to restore the circulation to normal.
 2. To reduce the amount of plasma protein which enters the interstitial fluid.
 3. To shorten the period of stagnant anoxia which is a view to reducing ischaemic injury to the patient.
- A marked chloride retention occurs in patients receiving adrenocortical extract. Such patients should not be given any sodium chloride unless its administration is indicated by chemical analysis of the blood.

SAMUEL KERRY, M.D.

Kirschner M. The Treatment of Gun Shot Wounds *D. B. Handlung der Chirurgie* 1940 37: 257

This treatment is confined to gunshot wounds such and consequently deals with the mechanical effect of the bullet on the skin, soft parts and bones. Therefore it includes 95 per cent of all war injuries. A severe hemorrhage should be arrested as quickly as possible by ligation of the extremity. Ligatures at the point of laceration is no longer practiced. Transfusions of preserved blood are available to combat the effects of hemorrhage. The danger of infection is lessened from blood banks back home to combat the effects of hemorrhage. The danger of infection is least with rifle bullet wounds (44 per cent) and greatest with mine wounds (100 per cent).

The rough projectiles damage tissues severely. Grenade wounds especially are frequently associated with shattering of the bones. The bone splinters act as secondary missiles. In this manner the factors which favor the development of infection are produced. Wounds which are caused by smooth surfaced projectiles can be left alone without operative intervention. Wounds due to rough projectiles demand operative care as soon as possible.

These rules are first carried out in the field hospital to which the wounded are transported with a team.

porary dressing. The tissue surrounding the wound is cleansed and the skin is disinfected with cephalol solution. Complete débridement of the wound, with the cutting done through the healthy tissue is preferable, but this is not often possible. Projectile splinters and other foreign bodies are removed only when this can be done with ease. Bone splinters are removed only when they are entirely free. Occasionally a cut tendon or nerve can be sutured, in rare cases a vessel can be sutured.

The author prefers rivanol solution (1:1000) as a chemical antiseptic for the irrigation of wounds and iodoform (vioform) for gauze. Gunshot wounds are left widely open. In only exceptional cases may they be partially closed and drained, but they are practically never closed completely. If no inflammatory phenomena appear secondary suture may be done.

The question of operation of these wounds depends upon the time interval. However, even in late cases operation may be successful and at any event must be attempted.

Antitoxin (tetanus antitoxin and gas-bacillus serum) is administered as a prophylactic measure. The internal administration of antiseptics like prontosil is hardly profitable. Of greatest importance in the combating of infection is complete immobilization of the wounded limbs, especially if bones are injured, in which case reduction of the fracture can be considered only if the danger of infection is not a contraindication. Different types of plaster bandage may be used for splinting and traction. For transportation from the front lines for the first clinical treatment, the simplest and best procedure for a fracture of the arm is to fasten it to the body. Fractures of the lower extremity are immobilized in traction transporting splints without attempts at reduction. Until the danger of infection has passed, the wounded should be transported as little as possible even within the hospital. All necessary dressings and other measures should be carried out in the bed of the wounded. The physician shall come to the wound but not the wound to the physician.

(GENEWEL) EDWARD W. GIBBS, M.D.

Matthews, D. N. The Surgery of Air-Raid Casualties. *Am Surg*, 1941, 113, 910.

The author discusses the treatment of the following casualties:

Shock and hemorrhage. Plasma is ideal in the treatment of these cases, and is used in the form of citrated plasma. In cases of severe hemorrhage, whole blood is needed to replace the loss. All stored whole blood and all stored plasma must be filtered before its administration.

Chemotherapy has been of inestimable value in preventing sepsis and in sterilizing old chronically infected wounds. All raw surfaces are sprayed with sulfanilamide powder, whether they are to be sutured or left open, it is quite safe to produce a thin white covering, no matter how extensive the injured area is.

Compound fractures. These are extremely common. The principles governing their treatment may

be summed up as conservative amputation, large incisions to remove lacerated muscles, liberal spraying with sulfanilamide, and rest of the affected limb in a plaster-of-Paris splint, which is cut from end to end and windowed over the wound.

Gas gangrene. Large incisions are made, with no thought to the cosmetic appearance, and all muscle is removed, until normal bleeding occurs. Sulfanilamide is then sprayed throughout the entire wound, which is then lightly packed. Anti-gas-gangrene serum is administered (40 c.c.) and 30 gr. of sulfanilamide are given daily by mouth.

SAMUEL KAHN, M.D.

Wenzl, H. Has the World War Definitely Decided in Favor of the Necessity of the Suture of Blood Vessels? (*Hat der Weltkrieg eindeutig fuer die Notwendigkeit der Gefaessnaht entschieden?*) *Wien med Wchrschr*, 1940, 2, 932.

This question is answered decidedly in the affirmative. The author compares the advantages of suture and ligation of blood vessels. This study is particularly valuable because in recent times suture as compared with ligation has been pushed into the background by some of the leading clinicians of Germany (Magnus, Sauerbruch). The author presents a concise but nevertheless complete review on gunshot wounds of blood vessels and emphasizes the most important features.

Spontaneous healing of shot wounds of blood vessels, even with complete shootings off, does occur. However, it is never seen in penetrating gunshot wounds of the large blood vessels. Early ligation previous to the formation of the collateral circulation of large vessels naturally leads to necroses more often than late ligation. Lever considers the figures of Wolf as too low. These indicate gangrene in 50 per cent of the cases of involvement of the common iliac artery, 25 per cent in involvement of the femoral artery below the profunda, 15 per cent for the popliteal artery, 12.7 per cent for the external iliac artery, 15 per cent for the axillary artery, and 4.8 per cent for the subclavian and brachial arteries. These represent the figures for peace times. Following ligation of the popliteal artery at the dressing stations and field hospitals the author always found gangrene.

Aneurysms were rare in former wars, for example, there were 44 in the War of 1870 and 1871. With the introduction of the small-calibered infantry projectiles and through the reduction in size of the grenade splinters as a result of a greater explosive charge, the number of aneurysms has considerably increased. The arteriovenous aneurysms exceed the arterial in number, however, the latter generally become larger and cause more severe symptoms. In the former the aneurysmal varix and the arteriovenous fistula predominate. The larger arterial aneurysms rapidly lead to nervous symptoms and, particularly, to contractures of the joints, which may be difficult to relieve even after an operation. With these, furthermore, there is the much greater danger

dures, which is known as Kuntze's operation, is recommended.

The lids are gently held apart by an assistant and lifted off the eyeball to avoid all pressure and the consequent squeezing out of the contents of the eyeball. A few drops of 5 per cent cocaine and some of the same merthiolate solution are used to clean the conjunctival sac, but washing out should be avoided. On the side nearest to the wound the conjunctiva is picked up and cut with a scissors, a ribbon being formed which can be gently slipped down over the cornea and laid over the length of the corneal wound. At each side the ribbon is held in place by a suture. Both eyes are bandaged. In four or five days the sutures will cut out, and often the ribbon will retract and show a healed cornea.

The largest wound of the eye ever repaired by the author was a transverse cut across the cornea and as far again through the sclera.

LESLIE L. MCCOY, M D

Ivy, R H, and Stout, R A. Emergency Treatment of War Injuries of the Face and Jaws. *Ann Surg*, 1947, 113: 1001.

A correlated plan of treatment of injuries of the face and jaws, if carried out from the advanced zone to the installations in the rear, will shorten the period of disability and restore function and appearance more nearly to normal. Such a plan is being prepared by the Surgeon General and special training is being given to medical and dental officers whose close cooperation is most important in handling these injuries. A manual covering the various phases and problems of treatment is in the course of preparation.

The most advanced unit, the mobile surgical hospital, will have a maxillofacial team consisting of a surgeon and a dental surgeon. The initial emergency care will be given at advanced posts or battalion aid stations where first-aid packets containing equipment for carrying out procedures demanding special attention will be available. A medical and dental officer are assigned to these stations.

There are four points of importance in this emergency care:

1. Hemorrhage may be controlled by digital compression over the artery lying proximal, or a pack in the wound itself held in place by a bandage can check bleeding by pressure. Care must be taken not to interfere with respiration. Occasionally vessels will have to be clamped and ligated.

2. The respiratory airway may be inadequate if there is much loss of bone and muscle. This can be controlled in several ways: by a stitch or safety pin through the tongue to pull it forward, by a rubber tube through the nose or mouth into the nasopharynx, or by a tracheal puncture or tracheotomy.

3. Temporary approximate reduction and fixation of bone fragments is carried out by the dental officer. The wound is cleaned, and tooth fragments, foreign matter, and completely detached fragments of bone are removed. The fragments remaining attached to



Fig 1. Forward traction of either upper or lower jaw by emergency apparatus made from tongue depressors and bandage. (Courtesy of J B Lippincott Co.)

soft tissue are preserved and reduced by manipulation, and fixed temporarily by bandage and elastic traction. Fixation of lower to upper teeth is not done prior to unattended travel. These procedures help to relieve pain and shock, to maintain a clear air passage, and to reduce the danger of recurrent hemorrhage. If there is backward displacement of the upper or lower jaw which interferes with respiration, a simple splint devised at the Walter Reed General Hospital has been found useful (Fig 1). The elastic band can be attached in this to the upper and lower teeth and constant traction will be maintained.

Soft-tissue repair should not be attempted in large gaping wounds of the face before at least temporary reduction and fixation of the bone fragments has been carried out. It is often better to cover exposed ends of bone by suturing skin to mucous membrane, and thus hasten healing and permit earlier permanent reparative procedures. Dependent drainage of all wounds of the lower jaw communicating with the mouth is essential.

4. Transportation from the combat zone to hospitals in the rear presents the usual problems of shock, sedation, and feeding. There is convincing proof that these patients should be transported sitting up. They should be transported face down if any danger of respiratory obstruction exists.

The base hospital is provided with adequate equipment and special personnel to care for these patients but much depends on the kind of preliminary care given in the more advanced zone.

BRADFORD CANNON, M D

INTERNATIONAL ABSTRACT OF SURGERY

480

Hauenstein K Gunshot Wounds of the Jaws
Their Treatment and Progn (Die Schuss-
verletzung des Kiefer ihre Behandlung und Pro-
gnose) Med Woch 1940 p 189

The author discusses the main problems of gunshot wounds of the jaws in a concise manner. He calls attention to the fact that most of the time with the exception of very cold weather the face remains uncovered and therefore the wounds are not contaminated by infectious particles of clothing. He also points out that the blood supply to the smooth muscles is very good and that the saliva does not play a great role in producing infection in spite of the numerous bacteria present.

The author maintains that the fracture of the jaw should receive attention before the injured soft parts are taken care of. Although the eight hour limit is thus frequently passed this seems to be of no great practical importance. The delayed secondary suturing is very important in injuries of the face. The wound should never be completely closed. The provision should always be made for drainage of the secretions.

The treatment of the fracture may be divided into two phases the temporary and the permanent. When teeth are present any type of wire splint or the simplest treatment. Sometimes a rigid or semi rigid intermaxillary dressing may be necessary. Rubber or metal splints are employed if no teeth are present. If the angle of the jaw is fractured it is advisable to apply a pad pushing the ascending branch of the jaw in a dorsal and downward direction. If the neck of the jaw is broken the author places a cork slice between the molar teeth and approximates the central portions of the jaws with intermaxillary bands in order to counteract the pulling effect of the muscles. If the upper jaw is broken in such a manner that it is separated from the base of the skull intra-oral or extra oral dressings are used. Teeth located between the fragments must not be removed in every instance. Removal must be made according to the conditions found. Frequently the teeth must be left in situ to facilitate the application of splints.

Traumatic exposure of the sinuses is of great importance. Radical procedures are not advisable in cases of this type. Irrigation and tamponade may be followed by good results. Only loose bone fragments should be removed. Even if the base of the orbit is fractured the eye can be lifted by placing sponges in the maxillary sinus.

Pedunculated flap from distant portions of the body are not advisable for the correction of deformities resulting from facial injuries. As a rule sufficient material can be obtained from the face and the neck.

In injuries of the cheeks the mouth may sometimes become too small after secondary suturing or after plastic operations and in such cases the corresponding pocket of the cheek may be stretched by the introduction of hard rubber wedges which are gradually increased in size.

The author emphasizes the fact that even extensive wounds of the tongue may heal without infection after suturing. (FRANZ) JOSEPH K. NARAT M.D.

Schulze W and B. Izendahl W The Treatment of Infected Shotgun Wounds of the Skull and Brain in The Military Hospital (Zur Kriegswundenrettung des Kopfes) Schiedl. Geh. med. Ges. D.utsche med. Woch. 1940 5 514

The material for this report consists of 20 wounded who were under the care of a surgeon in collaboration with neurologists and roentgenologists from the time of their admittance for upward to seven or eight weeks in the military hospital at Lodz during the campaign in Poland. The necessity of this collaboration is emphasized. Certainly it would be nearer the ideal if such patients could be brought directly to the homeland by airplane however this is not always possible. Therefore it is necessary to erect such specialistic stations in the war zone where the wounded person may remain under the care of one and the same physician for lengthy period of time.

The majority of the authors' patients came under their care only after two to four days. In 5 of these their condition was worse than what it had been at the H.V. I (Chief Dressing Station) or the F.L. (Field Hospital) which was ascribable to the conditions of transportation. Two of these patients had an acute psychosis beginning as an excitation stage. 3 were totally unconscious. In the treatment of these conditions the authors recommend the intravenous administration of 40 to 50 per cent. Shock and avertin. None of these patients had been given special bandage for transportation including splints or moulded supports of any sort. The placement of the patient on the hard pillow of the modern automobile inflatable rubber pillows like the modern automobile mattress for camping should be provided. In 3 of the wounded soldiers the skin wound had been excised and then closed by suture at the front. In 1 without removal of the focus of maceration in the brain and as the sutures were opened a flood of pus splinters of bone and clumps of brain tissue shot out. Such superficial methods should be discarded from. In 2 of the patients the macerated focus of the brain had been open and nevertheless and then the dura closed again. This soldered of encephalitis. In the second reoperation was necessary because of the fact that not all the bone splinters had been removed. From these experiences the authors conclude that such procedures are inappropriate. Two other cases of roentgen control are of an already developed inflammation of the covering of the base of the brain and 2 exhibited the same condition in its developed stages. All of these cases showed an already developed infection of the wound. To this might be

added general symptoms, fever with slow pulse, outspoken stupor, raging headaches, vomiting, nausea, lethargy. A few had involuntary stool and urine excretions.

Although the twenty four hour limit had been surpassed in these cases, the authors resorted to operation, despite the fact that the wounds were already in the intermediate stage. Because of the inflammation of the skin tissues, local anesthetics were not given. Under general narcosis with ether, the wound areas were disinfected with tincture of iodine, the edges of the skin wound excised, and the apertures in the bone widened with the Luer forceps. When the dura had not been injured, the operation was not carried further. When the dura had been opened the wound was washed out, the splinters were removed with the anatomical pincette, and the wound was explored with the finger. No form of suction was applied. The drainage tube was used for twenty-four hours, loose tamponade with iodoform gauze was done, and the lowest strips were not removed until two or three weeks had elapsed. No sutures nor splinted dressings were used. The patient was placed on the sound side. The authors have not been able to make up their minds to do a subsequent suture or transplantation of a skin flap following the cleaning-up of the wound, which was successfully done a number of times by Toennies. Only once during the removal of splinters did the authors experience a severe hemorrhage from the sinus transversus, this was controlled by an implant of muscle tissue.

In the after-treatment special stress is placed on a daily intravenous infusion of 40 to 50 per cent dextrous solution for as long as four weeks, the authors see in this a definite advance in treatment. The raging headaches which follow the operation soon recede, likewise the fact that the authors have experienced only 2 instances of prolapse of the brain in the after-treatment is ascribed to this method, both pronunces underwent a spontaneous (of course, lumbar punctures had been employed) recession. No secondary abscesses were seen during the six to eight weeks which the patients spent in the authors' hospital. On the other hand, 3 instances were observed in which the general condition of the patient and the wound became worse following a banal infection of the pharynx or nose. The excitation or lethargic states appearing at this time were interpreted as a beginning encephalitis, but these manifestations disappeared following treatment with prontosil, lumbar puncture, and a dextrose solution.

There were only 5 deaths, which, in consideration of the fact that only 2 of the cases were mild, grazing shotgun wounds, was a strikingly favorable result. All of the rest were severe infected wounds, mostly tangential, in part with injury to the nasal accessory sinuses, which were immediately opened. Two patients already had a meningitis on admittance, a third had a large defect with extensive opening-up of the ventricle, the remaining 2 developed encephalitis, and of the last 2, 1 had suffered an injury to the brain stem, which before death was manifested

as a rapid emaciation with an abnormal appetite for food. When the time came for transporting the patients from the hospital, the 15 who lived exhibited a healed or almost healed wound and a regression of the previously present deficiency symptoms.

The authors then give a detailed report of the case history of the more instructive cases, with 17 illustrations and neurological considerations. Among the latter, it is interesting to note that an unfavorable outcome was indicated by a peculiar apathetic behavior, such as one sees in the catatonic state (FRANZ) JOHN W. BRENNAN, M.D.

Caldarera, E. The Treatment of Thoracopulmonary Wounds (Sul trattamento delle ferite toracopolmonari) *Arch ital di chir*, 1940, 59 347

A notable advance in the treatment of pulmonary wounds was made during the World War by the use of artificial pneumothorax, which is the method of choice to stop primary and prevent secondary hemorrhage. In 1933, Latteri treated fractures of the ribs with alcoholization of the intercostal nerves and later recommended his method for simple thoracopulmonary wounds as well as for those complicated by fracture of the ribs, because it accomplishes the anatomical and functional conditions which favor healing of the pulmonary wound and of the fracture. The method causes partial collapse of the lung and has given excellent immediate and late results in the hands of various authors.

Caldarera reports 5 cases of ballistic wounds of the chest and lung complicated by rib fracture, in which he has used this method, the number of intercostal nerves subjected to alcoholization varied from 5 to 8, according to the conditions, and the results did not leave any doubt as to the excellence of the treatment. There is practically complete immobilization of the region innervated by the alcoholized nerves and the lung is placed in a relative state of rest which is sufficient for the purpose. Hemorrhage is completely arrested. As a rule, hemothorax present before alcoholization is left alone because it compresses the lung and helps to stop hemorrhage, it is aspirated only in cases in which it produces threatening symptoms of compression, just enough blood is then removed to eliminate immediate danger. There are cases in which the symptomatology simulates grave pulmonary compression, this is due principally to the pain at the site of fracture which is exacerbated by the respiratory movements, especially inspiration, and results in frequent, shallow respirations, alcoholization of the intercostal nerves causes immediate disappearance of the intercostal symptoms. Another result of alcoholization is an increase in the vital capacity of the lung as soon as the pain ceases. The remarks made about hemothorax apply also to spontaneous pneumothorax, with or without hemothorax, but spontaneous pneumothorax may be dangerous if pre-existing pleural adhesions have kept the pulmonary wound open, in such a case aspiration of the pneumothorax is indicated at the same time as alcoholization.

According to Latta: the alcoholization of 5 intercostal nerves should be completed in one sitting the point of entrance of the projectile should also be included in the territory of the treated nerves. The method is especially valuable for war wounds that need urgent intervention such as operation or pneumothorax which cannot be performed in small dressing stations in such stations alcoholization can easily be done.

RUSSO KEMER, MD

Turner G. Gunshot Wounds of the Heart *Bull M J* 1941 1 938

Gunshot wounds of the heart are usually accompanied by serious damage to the thorax or other parts of the body and many are associated with infection. The immediate causes of death are the great severity of injury, shock or hemorrhage and under hemorrhagic cardiac tamponade. Late deaths are due to sepsis, embolism or associated injuries.

Acute tamponade results when the injury of the cardiac wall does not permit ready escape of the blood from the pericardium so that the increasing pressure in the sac embarrasses and finally arrests cardiac action. After a latent period which may be as little as ten minutes the patient complains of oppression at the heart and becomes uncontrollably restless while the countenance becomes cyanosed and the body surface cold and moist from perspiration. The big veins at the root of the neck become overdistended, the pulse is irregular and fluttering, the arterial dullness is increased and at the same time the heart sounds are muffled and obscure. Unless promptly recognized and treated the condition is rapidly fatal. Opening the pericardium offers the patient's only chance for survival and is advised as long as some evidence of cardiac function remains.

The diagnosis of cardiac wounds is suggested by situation near the cardiac area although the wound of entrance may well be in the lateral chest wall in the axilla or even in either upper extremity. With a missile impacted in the heart the suspected diagnosis is confirmed only by roentgenography.

Wounds from shell shrapnel are usually more serious than bullet wounds because of the common associated sepsis. Besides cardiac tamponade the open wound from shell fragments is likewise a surgical emergency and the indications are to arrest hemorrhage to treat shock and to anticipate sepsis. These conditions are met by excising the wound in the parietes by inspecting the heart and suturing any bleeding lacerations, removing a foreign body if it is easily removable. Foreign bodies that are less accessible are better left alone at this stage. Drainage of the pericardium and the removal of chemotherapy are sufficient.

The parasternal exposure of the heart of Theodor Kocher (described in the article with 3 illustrations) is recommended as the safe procedure when the gunshot wound even if enlarged does not give ready access to the injured area. When the heart is exposed it will be found difficult to handle. While

it may be pushed from side to side or partially rotated without interfering with the heart action handling of the base or exerting pressure on the posterior surface at the top of the interventricular septum will invariably stop the heart beat. When the vena cava is allowed to fall back gently massage will usually restart the heart. To assist in the process of turning the vena cava a stitch may be placed through the thick central part of the muscle wall near the apex. Gentle pressure with the finger tip will usually control bleeding until the sutures can be applied. Turner recommends oochromic catgut or fine silk sutures placed 1/4 in from the wound margins with a good hold in the muscle and about the same distance apart. A piece of fresh muscle laid over the area will act as a hemostatic patch.

In the severely wounded local anesthesia will suffice. Otherwise there is no contraindication to the judicious use of a general anesthetic.

After the emergency has passed exploration for missiles lodged in the heart is to be considered because while they may remain safely impaled they may be a source of emboli, may become dislodged and may be a cause of cardiac irregularity or disability, because of the fear of tragic consequences instilled in the patient's mind. The Kocher approach is satisfactory for the intervention. After a decision has been made as to the position of the cardiac incision, sutures should be placed on either side of the proposed cut as they aid in the control of bleeding. The muscle must be carefully coaxed out and not forced and the defect carefully closed with sutures. Foreign bodies in or about the pericardium when associated with sepsis and giving rise to symptoms likewise merit exploration.

EDWIN J. FLASKI, MD

Storck A. H. Abdominal Injuries in Swit. *1941 13 7*

The destructive character of abdominal injuries incurred in the theatres of modern warfare as well as the increased difficulties of collection, transportation and treatment of abdominal casualties cases have to a great extent counteracted the advances in method for treating these war injuries. The multiplicity and anatomical destructiveness of most of the present wounds are incompatible with life and even the injuries which are not inevitably fatal are usually so serious that survival of the patient is dependent upon the employment of every appropriate aid both non-operative and operative.

The present reduction of abdominal injuries is limited to a general consideration of the methods especially certain newer ones for reducing the incidence of and ameliorating the seriousness of the injuries.

Preventive measures. Although complete prevention of abdominal injuries is obviously impossible there are means of substantially reducing the total number as well as the extent and multiplicity of these wounds. Some of these methods are:

1. Education of armed forces and civilian in precautionary measures to avoid injuries caused by

moved only if they lay free in the joint and had not lodged in the bone. For this purpose the author employed the anterior incision in the deltoid pectoral space. In the cases having an aseptic course the plaster cast was removed early and the arm was placed upon an abduction splint made of Cramer splints in order to allow the beginning of functional therapy as soon as possible.

In the infected cases, which amounted to 72 per cent, 3 basic procedures were followed uninterrupted: fixation in abduction and anteversion, good drainage, and open wound treatment without dressings. During the Spanish War the occlusive method of treatment was also frequently used. Frusta obtained excellent results with this method. However, his patients were civilians injured in bombing raids who could be brought to the hospital in a comparatively short time. However, Vidal regards this method of treatment for the war wounded seen in the first front line stations as improper. Later on, however, when the infection has subsided he believes this treatment may be an excellent one. This also applies to the cases of minor osteitis after sequestromy. In all other cases, treatment by absolute fixation and without bandaging of the wound is preferred. Aspiration of the joint comes into question only in cases of empyema, in phlegmon of the capsule only very little or no pus is obtained. Aspiration of the joint is performed by the author at the posterior end of the acromion between the outer margin of the deltoid and the tendon of the infraspinatus. In most cases of joint empyemas, aspiration of the joint suffices. In phlegmon of the capsule, arthrotomy must be performed. Vidal, in agreement with Payr, prefers posterior arthrotomy because of the better drainage. The arthrotomy wound is not drained by rubber tubes but rather by strips of rubber dam. All of these procedures, however, are carried out while the joint is at rest in a chest-arm plaster cast or upon an abduction splint.

The author then devotes an entire chapter to secondary resection of the joint, a procedure which he, as a pupil of the Viennese school, completely rejects because of its poor end-results. This procedure is not necessary for the drainage of pus from the shoulder joint, and it also predisposes to the formation of a flail joint. Without resection the desired ankylosis usually occurs within three months, whereas with resection it may occur much later or not at all. The author's successful results attest the correctness of his therapy. His results showed that in 23 cases of phlegmon of the capsule, not 1 patient died.

AFTER-TREATMENT

In aseptic cases the abduction splint is removed after from four to six weeks, provided that the wounds are healed, in infected cases functional therapy may be started even if the wounds have not healed, provided that bony ankylosis has been attained. Vidal demonstrates, by means of illustrations and pictures, what results may be obtained in aseptic and ankylosed joints by means of a good

after-treatment. In 36 per cent normal motion and in 30 per cent a mild limitation of mobility was obtained, in the latter cases, however, the arm could always be brought to the horizontal plane. In contradistinction to these results, Erlacher was able to demonstrate a normal mobility in only 5 of 284 cases of gunshot wound of the shoulder joint which occurred during the World War. With reference to the ankylosis, all observers agree that the best position is abduction of 40 degrees and light, moderate anteversion. However, these authors are by no means uniform in their opinion as to the method of fixation and attainment of the desired angle for ankylosis. Bastos and Arguelles are of the opinion that placing the arm in a midposition is equivalent to an abduction of 45 degrees. This conception, however, is not correct according to the findings of Boehler. The mid-position of the arm is equivalent to an abduction of 90 degrees and an anteversion of 40 degrees. This position is similar to a double right-angle splint. The abduction is always attained for two-thirds of its course through the mobility of the scapulohumeral joint and for its other one-third through turning of the scapula. For this reason they always fix all of the cases of gunshot wounds of the shoulder joint, including the aseptic ones, at an angle of 90 degrees abduction and 40 degrees anteversion when the first treatment is given in the secondary war medical stations, and thus, with this method of treatment, an ankylosis at an angle of from 40 to 50 degrees is obtained in the infected cases in which an ankylosis is desirable. With this form of ankylosis the patient is able to raise his arm to the horizontal plane. The author repeatedly emphasizes the importance of the position of anteversion as introduced by Boehler. In the 14 cases of old injuries of the shoulder joint Vidal occasionally found adduction contractures, resulting from improper treatment, which were very difficult to overcome. Furthermore he was against the too early removal of sequestra. One should wait at least four months.

In conclusion, he touches upon the shoulder-joint arthrodeses, by means of which one can obtain good functional results. He also presents a series of statistics. While the mortality during the American Civil War still amounted to 30 per cent, that of the War of 1870 and 1871 to 34.6 per cent, and that of the World War from 3.5 to 5.08 per cent, Arguelles, who also used the Boehler technique and treated a total of 89 injuries of gunshot wounds of the shoulder joint, did not have a single mortality. Whereas in the World War, Tuffier saw flail joints in 38 per cent, Erlacher in 16 per cent, and Boehler in 3.5 per cent, these two authors had none. As far as the mobility is concerned, Erlacher, during the World War, saw a marked limitation of motion under 90 degrees in 36 per cent of the cases, these authors saw none, limitation of more than 90 per cent was seen by Erlacher in 2 per cent, by Boehler in 39.5 per cent, and by Vidal in 30 per cent. Normal mobility was found by Erlacher in 1.5 per cent, by Boehler in 18.5

Even these cases could be brought to complete resorption by proper treatment (puncture and splinting) provided the cartilage is not destroyed.

c Phlegmon of the capsule 20 cases or 30 per cent. This is in reality a cellulitis synovitis. In this condition the formation of an ankylosis offers the best prognosis. This condition usually causes the formation of paratubercular abscesses in the posterior portion of the shoulder joint. The fluctuation then shows itself on the posterior inferior portion of the deltoid and less frequently on the anterior border.

d Putrid inflammation of the shoulder joint 3 cases or 5 per cent. The author never encountered typical gas gangrene. Two cases showed this condition as early as after forty-eight hours; in a third it appeared after six days without any warning. All of these wounds were the result of artillery gunshot and all the patients had received their wounds at the same place within the course of three hours. Soil and climatic conditions must certainly play a part in this infection. Apparently the putrid infection runs its course only in the soft parts. To be sure occasional gas blebs occurred in these cases but they could not be regarded as typical gas gangrene edema. Incisions and splinting of the part caused these putrid infections to subside after eight days.

Although formerly the diagnosis in injuries of the shoulder joint was often difficult, this is not so today because the roentgenogram gives conclusive information. The Spanish Field Hospitals where the patients were classified all had portable x-ray apparatus.

The author then discusses secondary symptomatic hemorrhages 3 cases or 4.5 per cent. In 2 instances these could be controlled by tamponade and in 1 case the thoraco-acromial artery had to be ligated. Treatment at the first aid station consisted of a sterile dressing and bandaging of the arm to the chest. Theoretically in the classification station the proposal of Franz Magnus and Payr of primary wound debridement and suture of the capsule without skin suture is no doubt correct but in practice this procedure cannot be easily carried out. In all of the through and through gunshot wounds of the joint with minimal entrance and exit wounds as well as in cases of penetrating gunshot wounds of the joints with a punctiform wound of entrance (63 to 70 per cent) this method does not come into question.

The author emphasized the fact that even before were able to employ a primary capsule suture the muscle or skin wound would nevertheless have to be left completely open. In the presence of extensive injury of the soft parts such as severe tangential wounds accompanied by splintering and destruction of the joint the thought of a primary capsule suture is a Utopia and to rely upon a difficult plastic operation is sheer thoughtlessness.

The author is an opponent of every form of usual antiseptic just as is his teacher Boehler. Dakin solution has not been used for a long time. Freund on the basis of experimental research regards the use

of the Chlumsky solution as a prophylactic as absolutely injurious. Boehler has proved on the basis of 17 open knee joint injuries and 18 open elbow injuries which he treated and cured only by debridement and primary capsule suture that one does not need an antiseptic.

In the presence of joint injuries one should proceed in a purely surgical manner. The debridement should be carried out as soon as possible however this should not be done at the very front line but at the Classification Station. He discards joint resection both as a primary as well as a secondary procedure. This operation was carried out much too frequently in the previous wars. Thus for example in 1870 and 1871 this procedure was still carried out in 58.5 per cent of the cases. In reviewing the resections of the various wars of the previous century Gurli found a 35.5 per cent mortality and in the war of 1871 there was a 39 per cent mortality. Tuffier gathered together 330 resections of the shoulder joint which were performed during the World War. Of the surviving patients 38 per cent had a flail joint. During the Spanish War resection of the shoulder joint was carried out very rarely. Vidal says that the primary joint resection should not be performed in the Classification Station. One should only remove the bone fragments which are loosened from the periosteum exactly as in a fracture of the shoulder.

The author never performed exarticulations of the shoulder joint the value are not indicated unless it should be in the presence of complete destruction of the joint associated with extensive soft part injury and laceration of the artery.

For the purpose of transportation from the Classification Station after first aid has been rendered the best form of bandage is the plaster of Paris cast which retains the chest as well as the entire upper extremity and holds the latter in a position of abduction and anteversion. The ready-made abduction splint as well as the Cramer wire abduction splint are not suitable for this purpose. In this transportation cast the abduction angle should be only about 45 degrees the forearm must be in a position of pronation and the fingers should not be included in the cast. With this dressing the injured person should be transported directly to the special hospital which ordinarily should be situated about 200 kilometers behind the lines. Intermediate stations can only cause harm because the primary cast can too frequently be removed and applied improperly and various doctors might very likely undertake various methods of treatment.

When the patient has arrived at the final base hospital x-ray pictures should be taken in 2 planes. The x-ray cassette should not be placed in the frontal plane but rather in the slightly oblique plane so that the central ray is tangentially directed toward the glenoid fossa. 4 grains of film were used. It was only after the x-rays were taken that the wounds were cut in the plaster cast and treatment of the wound was instituted. Penetrating missiles were then re-

moved only if they lay free in the joint and had not lodged in the bone. For this purpose the author employed the anterior incision in the deltoid pectoral space. In the cases having an aseptic course the plaster cast was removed early and the arm was placed upon an abduction splint made of Cramer splints in order to allow the beginning of functional therapy as soon as possible.

In the infected cases, which amounted to 72 per cent, 3 basic procedures were followed: uninterrupted fixation in abduction and anteversion, good drainage, and open wound treatment without dressings. During the Spanish War the occlusive method of treatment was also frequently used. Frusta obtained excellent results with this method. However, his patients were civilians injured in bombing raids who could be brought to the hospital in a comparatively short time. However, Vidal regards this method of treatment for the war wounded seen in the first front line stations as improper. Later on, however, when the infection has subsided he believes this treatment may be an excellent one. This also applies to the cases of minor osteitis after sequestromy. In all other cases, treatment by absolute fixation and without bandaging of the wound is preferred. Aspiration of the joint comes into question only in cases of empyema, in phlegmon of the capsule only very little or no pus is obtained. Aspiration of the joint is performed by the author at the posterior end of the achromium between the outer margin of the deltoid and the tendon of the infraspinatus. In most cases of joint empyemas, aspiration of the joint suffices. In phlegmon of the capsule, arthrotomy must be performed. Vidal, in agreement with Payr, prefers posterior arthrotomy because of the better drainage. The arthrotomy wound is not drained by rubber tubes but rather by strips of rubber dam. All of these procedures, however, are carried out while the joint is at rest in a chest-arm plaster cast or upon an abduction splint.

The author then devotes an entire chapter to secondary resection of the joint, a procedure which he, as a pupil of the Viennese school, completely rejects because of its poor end-results. This procedure is not necessary for the drainage of pus from the shoulder joint, and it also predisposes to the formation of a flail joint. Without resection the desired ankylosis usually occurs within three months, whereas with resection it may occur much later or not at all. The author's successful results attest the correctness of his therapy. His results showed that in 23 cases of phlegmon of the capsule, not 1 patient died.

AFTER-TREATMENT

In aseptic cases the abduction splint is removed after from four to six weeks, provided that the wounds are healed, in infected cases functional therapy may be started even if the wounds have not healed, provided that bony ankylosis has been attained. Vidal demonstrates, by means of illustrations and pictures, what results may be obtained in aseptic and ankylosed joints by means of a good

after-treatment. In 36 per cent normal motion and in 30 per cent a mild limitation of mobility was obtained, in the latter cases, however, the arm could always be brought to the horizontal plane. In contradistinction to these results Erlacher was able to demonstrate a normal mobility in only 5 of 284 cases of gunshot wound of the shoulder joint which occurred during the World War. With reference to the ankylosis, all observers agree that the best position is abduction of 40 degrees and light, moderate anteversion. However, these authors are by no means uniform in their opinion as to the method of fixation and attainment of the desired angle for ankylosis. Bastos and Arguelles are of the opinion that placing the arm in a midposition is equivalent to an abduction of 45 degrees. This conception, however, is not correct according to the findings of Boehler. The mid-position of the arm is equivalent to an abduction of 90 degrees and an anteversion of 40 degrees. This position is similar to a double right-angle splint. The abduction is always attained for two-thirds of its course through the mobility of the scapulohumeral joint and for its other one-third through turning of the scapula. For this reason they always fix all of the cases of gunshot wounds of the shoulder joint, including the aseptic ones, at an angle of 90 degrees abduction and 40 degrees anteversion when the first treatment is given in the secondary war medical stations, and thus, with this method of treatment, an ankylosis at an angle of from 40 to 50 degrees is obtained in the infected cases in which an ankylosis is desirable. With this form of ankylosis the patient is able to raise his arm to the horizontal plane. The author repeatedly emphasizes the importance of the position of anteversion as introduced by Boehler. In the 14 cases of old injuries of the shoulder joint Vidal occasionally found adduction contractures, resulting from improper treatment, which were very difficult to overcome. Furthermore he was against the too early removal of sequestra. One should wait at least four months.

In conclusion, he touches upon the shoulder-joint arthrodeses, by means of which one can obtain good functional results. He also presents a series of statistics. While the mortality during the American Civil War still amounted to 30 per cent, that of the War of 1870 and 1871 to 34.6 per cent, and that of the World War from 3.5 to 5.08 per cent, Arguelles, who also used the Boehler technique and treated a total of 89 injuries of gunshot wounds of the shoulder joint, did not have a single mortality. Whereas in the World War, Tuffier saw flail joints in 38 per cent, Erlacher in 16 per cent, and Boehler in 3.5 per cent, these two authors had none. As far as the mobility is concerned, Erlacher, during the World War, saw a marked limitation of motion under 90 degrees in 36 per cent of the cases, these authors saw none, limitation of more than 90 per cent was seen by Erlacher in 2 per cent, by Boehler in 39.5 per cent, and by Vidal in 30 per cent. Normal mobility was found by Erlacher in 1.5 per cent, by Boehler in 18.5

per cent and by Vidal in 36 per cent. Several tables and 28 illustrations are included in the article
(FRA 2) HARRY A. SALZMANN M.D.

Jimeno Vidal F. Gunshot Fracture of the Clavicle
Experiences from the Spanish War (Schleusen
be sch brueche Ert hrunge s dem spanis h n
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586

Most text books on war surgery stress the infrequency of the isolated gunshot fracture of the clavicle. Vidal has treated only 30 such cases in his own military hospital. Only 3 patients had a lung injury at the same time and 3 had neuroparalysis (2 of the plexus 1 of the median nerve). In his military hospital these fractures amounted to 1 per cent of all the gunshot fractures of the upper limbs. Arguelles observed that they occurred in 0.0 per cent of 532 fractures of the upper limbs. There were 17 badly infected gunshot wounds and 13 comminuted fractures. The outer one third was involved 10 times the middle third 10 times and the inner third once. The lungs are most often involved in wounds of the inner third. After extirpation in the classification hospital gunshot wounds of the clavicle are transportable if they are not further complicated by lung injury. Two of the author's cases had a clean hemothorax the third had in addition a suppurating inflammation of the skin of the breast.

In general the wound were small. Large wounds of the soft parts are nearly always complicated by wounds of the large blood vessels and the patients

bleed to death on the battle field. Among these patients there were no wounds greater than a five mark piece. Healing by granulation occurred in 56.5 per cent. In 13 cases 43.4 per cent suppuration occurred and in 2 osteitis with sequestration. There was no gangrene and no thrombophlebitis. Healing followed in four weeks. A temporary dressing was applied a cushion was placed in the axilla and a circular bandage around the arm and breast.

In the emergency hospital primary surgery of the wound was performed if necessary. The wound was left open and no sutures were used. Open wound treatment and wooden splint (Boehler) were used only occasionally was splinting done in abduction. All splintings with immobilization in adduction are to be condemned. Suppuration occurred in 13 cases but was of no significance in 8. Abscess formation requiring incision occurred only 3 times. Vidal reports very good functional results namely 90 per cent normal mobility and 55 per cent ability. Five illustrations accompany the original article.

(FRA 2) MARIAN BAR T. M.D.

Moore P. L. and Bracher A. N. March Fracture
Report of 3 Cases. *W. J. Med. J.* 1941 5

Three cases of march fracture were seen within a period of two months in a camp where 15,000 regular troops are stationed. In 2 cases the fracture followed the participation in athletics 1 followed a night march.

The symptoms were not insidious but came on at a definite time and period of activity accompanied with sudden almost disabling pain.

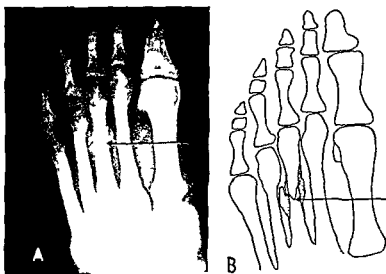


Fig. A: Roentgenogram of the foot showing the fracture of the fifth metatarsal. B: Drawing of the foot showing the location of the fracture. The drawing indicates the fact that the fracture is located on the lateral aspect of the foot, near the base of the fifth toe.

Edema on the dorsum of the foot begins approximately twelve hours after the onset of pain. Pressure over the involved metatarsal bone causes intense discomfort. The patient walks with a noticeable limp. An area of erythema over the fracture site may be present but the pain is not so severe as to be incapacitating.

The fracture may be overlooked in the roentgenogram until callus formation is present. The fracture occurs in the second to fourth metatarsal bones and in cases of metatarsalgia x-ray examination is indicated.

GEORGE A. COLLETT, M.D.

Caldwell, G. A. New Developments in the Treatment of Compound Fractures. *Ann Surg*, 1941, 113: 795.

The possibility of participation in hostilities, as well as the ever-increasing number of traffic and industrial accidents, has renewed interest in the treatment of compound fractures. Basic principles of treatment remain unaltered. Various modifications of details have been made during the past two or three years, some of them fundamentally sound. Many others, however, based on unreliable statistics, are misleading.

The statistics offered as evidence of the value of roentgenotherapy and chemotherapy in treating the complications of gas gangrene, without indicating whether or not surgical measures were employed concomitantly with these procedures, have left us in doubt as to their value.

Improved methods of estimating the degree of shock and loss of body fluids, together with more prompt and efficient treatment, make possible earlier debridement of compound fractures. The incidence of infections can, therefore, be diminished.

Tetanus antitoxin, as a preventive measure, will probably disappear as more of the military and civil population are immunized with tetanus toxoid.

Extensive preparation of the skin and wound with soap and water could be replaced by ether or iodine. Immobilization of the fractured parts by traction during the stages of preparation and operation is desirable. Implantation of sulfanilamide crystals in compound wounds is a valuable adjunct in preventing infection. Animal experimentation indicates that sulfanilamide has relatively little effect upon the progress of gas gangrene in closed wounds infected with *Clostridium welchii*.

Internal fixation of fragments followed by closure is safe only in carefully selected cases operated upon by competent surgeons who possess a good armamentarium of instruments and equipment. Post-operative fixation of open fractures in closed plaster encasements is objectionable and unnecessary. Adequate fixation which permits careful dressing can always be devised. Sulfathiazole in pectin jelly forms an ideal bland substance for dressing these wounds—it eliminates the odors, reduces the amount of discharge, and hastens healing.

The complication of gas gangrene can be recognized before it is revealed roentgenologically. The

treatment is essentially surgical, with the use of sulfanilamide and antitoxin as adjuncts. Roentgenotherapy alone has not yet proved its usefulness as a measure for arresting the progress of gas gangrene. Experimental work suggests that it has some inhibitory action under certain conditions.

SAMUEL H. KLETZ, M.D.

Bandeira de Mello, N. The Transport of Patients and the Wounded by Air (Die Ueberführung von Kranken und Verwundeten auf dem Luftwege). *Rev Med mil*, 1940, 29: 174.

The author discusses briefly the experiences collected up to the present time in the transport of wounded persons with aeroplanes in the Paraguay-Bolivian War, in the present European War (Polish War), and in the Spanish Civil War. Every three-motored transport plane can be prepared for this purpose, it should be supplied with the sign of neutrality and fitted up with 8 stretchers, which are hung on supports with leather straps, and the space for the purpose of applying dressings or injections to the patient should be sufficiently large. Naturally, dressing material, splints, and drugs must be carried along in sufficient amounts. The inclusion of 3 or more aeroplanes into a Sanitary Air Formation of great mobility is advisable. In this way 72 lying and 18 sitting patients can be transported by 3 daily flights. The aeroplane is the most comfortable, quickest, and safest means of transport for wounded and sick patients. The disadvantages consist mainly of the difficulty of transport to the aeroplane, which requires a suitable landing place, and of transport to the hospital after the landing.

With lying patients, vomiting is disregarded, air sickness and the lack of oxygen can be avoided by careful flying, not higher than 1,200 meters. The indications for and contraindications against transport by aeroplane are discussed briefly and the following conclusions are drawn:

1. The Sanitation Department of the mobile army should have at its disposal a Sanitary Flying Formation of 3 aeroplanes for the quick transport of the wounded and of patients from the Dressing Stations and Field Hospitals to the rear.

2. The aeroplane should be a three-motored transport plane suitably furnished for 8 lying and 2 sitting patients, a military surgeon should attend.

3. The demand for the aeroplane should proceed from the Army-Sanitary-Chief at the Dressing Station or Field Hospital with a report of the probable number of patients and their location.

4. The flying should not be done at a higher distance than 1,200 meters and in the quietest possible air layers.

5. Patients in a condition of shock or of threatening collapse must not be transported. Patients recently operated upon, or with gunshot wounds of the lung, severe anemias, and pneumonias can be transported only under special precautions and after weighing the advantages and disadvantages.

(STRAKOSCH) LOUIS NEUWELT, M.D.

6 No need for filtration before administration (This last claim is questionable because of the separation of particulate matter when the plasma is thawed)

The technical points for freezing are (1) rapid freezing (not more than from three to six hours) (2) maintenance in the frozen state (3) rapid thawing at 37 C. in a water bath or at room temperature (twenty five minutes) The majority of plasma at the Bryn Mawr Hospital is kept in this condition

Dried plasma The advantages of dried plasma are (1) it can be preserved and transported under all conditions (2) it can be rapidly regenerated with distilled water and (3) it may be concentrated From their long experience the authors warn that the proper drying of plasma is at best a difficult and expensive procedure The legitimate field of usefulness of dried plasma is in cases of adverse conditions of storage and transportation The routine use of concentrated plasma in the treatment of shock is considered unjustified

Units for the preparation of plasma Medical institutions of sufficient size should be provided with means for the collection of blood the separation pooling and freezing of plasma and a means of maintaining plasma in the frozen state Ninety per cent of the institution's needs for plasma can thus be met For the need of dried plasma a small apparatus or a cooperative scheme is suggested This entails the establishment of drying units The material to be dried could be transported as freeze-dextrated whole blood A National Preparedness program and the supply of plasma are outlined

Four J. P. Lasker M.D.

Miglietta M. Anesthesia of the Stellate Ganglion in the Treatment of Postoperative Pulmonary Complications (L'Anestesia del ganglio stellato nel trattamento delle complicanze postoperatorie) *Arch Ital di Ch* 1940 53 548

Postoperative bronchopulmonary complications are still serious matters for debate and controversy in spite of the great advances in surgical technique during the past few decades The complication occurs after local or general anesthesia Theories of their pathogenesis have shifted from the types of anesthesia to operative trauma Abdominal surgery offers the greatest incidence of the complications as compared to other types of surgery (10 per cent to 3 per cent) In abdominal surgery the greatest incidence of pulmonary complications occurs after work in the upper quadrants of the abdomen according to Hartmann and Murad gastric surgery has an incidence of 15 to 20 per cent of pulmonary complications while biliary surgery has from 12 to 14 per cent Surprisingly pulmonary surgery is very rarely followed by these complications

The author discusses the principal theories as to the pathogenesis of postoperative bronchopneumonia He mentions the possibility of bacterial emboli as demonstrated by Seferi The rhinopharynx is mentioned as a source of bacterial con-

tamination A local predisposition is necessary for the full development of the condition According to American authors such as Flavin and Corry the chief local condition that predisposes to bronchopneumonia is atelectasis This is the prevalent theory today for the explanation of the pathogenesis of postoperative bronchopneumonia According to the authors atelectasis occurs regardless of whether the anesthesia used is general local or spinal Only x-ray examination can demonstrate this condition very early Clinical examination is usually negative at the early stage of the process The duration of the atelectasis varies It may go on to a sudden resolution or to a fatal termination

The author continues with a review of the literature which attempts to explain the mode of origin of this atelectasis The causes mentioned include diminished pulmonary capacity hypoventilation of the lungs mechanical obstruction of the bronchi by plugs of mucus (Corry) vasomotor disturbances which produce a marked vasodilatation in the alveoli and reflex disturbances in the sympathetic nervous system induced by operative manipulations in the abdomen and which cause reflex pulmonary changes The author then gives a detailed description of the parasympathetic and sympathetic innervation of the lungs He points out the importance of the stellate ganglion of the cervical chain where many of these fibers seem to run together Many authors have demonstrated experimentally the existence of reflex pulmonary changes when the abdominal viscera are manipulated Carl Mummery and others have demonstrated that postoperative bronchopneumonia is directly correlated with surgical trauma Miglietta believes that these reflex disturbances are carried through the sympathetic nervous system Since most of the nerve fibers come through the stellate ganglion he believes that these disturbing reflexes may be controlled by local anesthesia of this ganglion He uses the technique of Lericq for this procedure which is illustrated with several technical drawings In this method 10 c.c.m. of 1 per cent novocaine is injected about the stellate ganglion on the affected side The procedure has its dangers namely the possibility of puncturing the subclavian artery the vertebral artery or the apex of the lung however with proper technique these dangers are avoided

Miglietta reports his experiences with this method in the treatment of 13 cases of postoperative pulmonary complication The stellate ganglion on the affected side is treated with novocaine when both sides were involved the treatment was given on the side that seemed most involved in the process Favorable results were observed in the temperature and clinical behavior recovery occurred in 11 of the 13 cases An improvement was obtained in 12 cases and the patients died in a few days one died of a massive multiple pulmonary emboli with myocardial weakening and the other had an atypical late development of pulmonary complications with an accumulation of pleural fluid which was found on

thoracentesis (this case acted more like a serious pulmonary infection than a reflex lung reaction)

The author concludes that his experiences tend to confirm the theory that sympathetic nerve disturbances are the cause of postoperative bronchopulmonary complications JACOB E KLEIN, M D

ANTISEPTIC SURGERY, TREATMENT OF WOUNDS AND INFECTIONS

Homans, J Minor Causalgia Following Injuries and Wounds *Ann Surg*, 1941, 113 932

Causalgia in its major form, seen chiefly in war, is well recognized, but its minor form is looked upon by most surgeons as something freakish, hysterical, or as an exhibition of malingering Serious causalgias are apt to follow wounds of certain great nerves The brachial plexus and the median and sciatic nerves are chiefly susceptible The syndrome takes the form of a disabled extremity, reddened and glossy, edematous, cool rather than hot, subject to a peculiar burning pain, sore to the touch, intolerant of dryness, and intensely sensitive to drafts and jars The bones are atrophied The muscles are or seem to be partly paralyzed These great nerves are susceptible because of their rich supply of blood vessels which, in turn, are abundantly furnished with vasomotor nerves Apparently, it is through an irritation of these tiny nerves that the secondary changes of causalgia occur, but that such nerves are strictly of a vasomotor nature is doubtful They are more likely to be related to the sensitivity of the blood vessels, and to carry centrally headed impulses which enter the spinal cord by way of the posterior roots Causalgia may thus be pictured as a vicious reflex which excites, through local connections in the cord, a combined sensory and vasomotor dysfunction

Related to the serious causalgias are traumatic edema and osteoporosis, Sudeck's atrophy of bone, reflex dystrophy of the extremities, and chronic segmental arterial spasm These differ from the syndrome described in being excited, not by trauma to the large nerves and vessels, but by a great variety of lesser injuries, blows, crushes, fractures, minor wounds, and especially punctures such as are made by splinters, thorns, and bites of animals It is of interest that they arise from the inflammatory, obstructive form of thrombophlebitis also, doubtless because the nerves surrounding the vessels are caught in the inflammation The changes in minor causalgia include atrophy of bone, disorders of joints, edema, paresthesia and vasomotor dysfunction, which usually leave a cool, smooth, bluish skin, but occasionally vasodilatation All these may appear together or in various combinations, a sensory-sympathetic disorder which may even spill over to the motor side Sometimes a minor causalgia is overlaid by a hysterical glove anesthesia, but most of the patients wish to recover and return to work, and take their plight hard

The basic feature of all causalgias is pain The condition has been described as the "posttraumatic

pain syndrome" However difficult it is to account for the pathological physiology of causalgic pain, it is certain that it depends upon a very unstable reflex, one which can often be broken up almost as easily as it has been established If its pathway is temporarily interrupted, on many occasions if necessary, it may disappear forever

In the treatment of the condition, the author prefers sympathetic block, although periarterial sympathectomy and lumbar or upper thoracic sympathectomy are also used successfully

SAMUEL KAHN, M D

ANESTHESIA

Pinotti, O, and Baccaglioni, G Changes in the Dynamics of the Circulation in the Course of Ether Narcosis and Spinal Anesthesia (Modificazione della dinamica circolatoria nel corso della narcosi eterea e della anestesia spinale) *Arch ital di chir*, 1940, 58 448

The author studied the dynamics of the circulatory functions in patients under ether narcosis and spinal anesthesia He used physiological sphygmomanometric methods to measure such factors as arterial pressure, pulse volume, minute volume, coefficient of arterial elasticity, total peripheral resistance, velocity of propagation of the pulse wave, and the elastic reserve He presents two tables of detailed data on each group of patients (15 in the ether group and 16 in the spinal anesthesia series) He stresses particularly the importance of the coefficient of arterial elasticity, noting that the aorta and the large arteries are not only elastic but also have a contractile function due to their smooth muscle fibers The body thus has the power to normalize arterial pressure in accordance with volume flow and peripheral resistance

The author found that in ether narcosis the arterial pressure was normal or slightly elevated, the pulse frequency was increased and the cardiac volume increased by 50 per cent The peripheral resistance was diminished

In spinal anesthesia the arterial pressure was decreased to the lower limits of normal and the cardiac volume flow as well as the peripheral resistance was diminished The arterial elasticity was either normal or slightly increased In brief, the circulatory changes in spinal anesthesia are similar to those found in peripheral collapse This is best treated with vasoconstrictors JACOB E KLEIN, M D

Smelovskii, V A Case of Arteriovenous Aneurysm of the Renal Artery Following the Lumbar Novocaine Block of Wischniewsky (Ein Fall von arterio-venosem Aneurysma der Nierenarterie nach einer lumbalen Novocainblockade nach Wischniewsky) *Chirurgiya*, 1940, 8 142

The pararenal novocaine block of Wischniewsky was performed on a patient with decompensated mitral disease Immediately after the injection there developed a severe general reaction with vomiting,

violent pain in the right abdomen muscular rigidity pulse acceleration and fever Three months after the injection an aneurysm could be demonstrated without doubt It can be assumed with certainty that the aneurysm developed as a result of injury to the renal artery at the time of the injection and that the initially observed infiltration in the region of the kidney was a hematoma

(W. PLATH) JOHN L. LINQVIST M.D.

Paramonoff V. A. Anesthesia with Injections of Ether and Oil According to Toptschbaschew's Method *Nov kh arkh* 1940 47 2 3

Toptschbaschew introduced a new method of anesthesia employing subcutaneous injections of a mixture of 10 parts of ether and one part of oil He uses 1 ccm of ether per kgm of body weight The introduction of the anesthetic mixture is preceded by an injection of from 5 to 10 ccm of a 0.5 per cent solution of novocaine Not more than from 15 to 20 ccm of the mixture are introduced at one point Anesthesia usually develops in five to fifteen minutes after the last injection If at that time no anesthetic effect is yet noticed an additional 15 ccm of the mixture are injected at another place

According to the originator of the method the patients react only to the first injection hardly remember the second and show a complete amnesia in regard to the third and fourth There is no interference with respiration Toptschbaschew maintains that his method furnishes a rapid effect in the form of a deep sleep and complete analgesia without asphyxia or postoperative pneumonia Among 380 cases abscesses developed in only 5

The author tested the method in 11 cases In 10 neither sleep nor analgesia could be obtained and the patients remained awake one hour and ten minutes after an introduction of as large an amount as 160 ccm of the mixture In 2 cases abscesses developed in one neuritis occurred and in another the skin at the site of the injection became necrotic

The author concludes that Toptschbaschew's method is not suitable for field surgery

JOSEPH H. NARAT M.D.

Williams A. C. and Marcus P. S. The Choice of Anesthesia in Ludwig's Angina *A. S. & I.* 1941 20 160

The authors desire to bring about a better understanding of the anesthetic and surgical problems met with in the treatment of Ludwig's angina Their study is based on 25 cases While the clinical pathological and surgical aspects of Ludwig's angina have been well presented in the American literature there are but fragmentary comments to be found concerning the anesthetics employed No recognition seems to have been given the fact that without complete co-operation between a thoroughly capable surgeon and an equally capable anesthesiologist adequate surgery is possible only under great difficulties and with considerable operative risk This is partly due to the fact that Ludwig's angina is a highly

dangerous disease even under the most favorable conditions Surgical procedure must go on under a particularly complicated set of conditions Besides the very limited choice of anesthetic agents and methods of administration which were possible up to ten years ago complicated the situation still more

It is only now that the science of anesthesiology is coming into its own With a wider range of anesthetic agents and better methods of administration we may look forward to a considerable improvement in operative results A recent study of 31 cases of Ludwig's angina reports a mortality rate of 54 per cent

This high mortality rate has been responsible for the present article in which Ludwig's angina is discussed from the standpoint of the anesthetic Anesthesia of sufficient depth and duration is required to permit a deep and generous incision of the inframandibular region of the neck Since partial respiratory obstruction is one of the cardinal features of this disease maintenance of a patent airway immediately looms as the anesthesiologist's chief difficulty

Local anesthesia has been advocated by some practitioners on the ground that the patients under consideration are generally in too poor physical condition to tolerate general anesthesia Contrary to this opinion however it appears that general anesthesia can be well tolerated provided a proper airway be maintained

As to the choice of anesthetic agents inhalation agents have little to recommend them beyond the fact that sufficient anesthesia can be produced to permit of extensive surgery Beyond that the disadvantages attendant upon their use are considerable In the first place the anesthetist is in the surgeon's way Moreover some degree of asphyxia of the airway is produced by inhalation agents as evidenced by coughing and gagging during induction Respiratory obstruction is sufficient degree to require tracheotomy frequently occurs with inhalation agents The high incidence of obstructive phenomena together with the consequent difficulties of continuing anesthesia through the tracheotomy should be sufficient to rule out inhalation agents in this condition

The authors report their experience in 25 cases of Ludwig's angina with the use of barbiturates given intravenously They consider the advantages of choice since they are safest and most convenient for the patient the surgeon and the anesthetist The barbiturates used were *evipal* and *pentothal* which were administered fractionally They offer a number of obvious advantages First of all the anesthetic is out of the surgeon's way The airway may be utilized fully for the administration of oxygen in a condition in which oxygen is most essential The induction is smooth and free from the struggling and gagging so common with inhalation agents The depth of the anesthesia is easily and quickly controlled The patient makes a quick recovery free from nausea and vomiting Should

tracheotomy become necessary at any time, an even level of anesthesia can be maintained throughout and the surgeon can proceed without further inconvenience.

The method of administering the barbiturates is outlined in considerable detail. The importance of being ready to perform a tracheotomy is stressed as a life-saving measure, regardless of the type of anesthesia employed, since respiratory obstruction arises in a certain number of cases regardless of what precautions are taken or the type of anesthesia that is used. The authors believe this to be a further indication for the intravenous administration of barbiturates for, even though respiratory obstruction should occur, the anesthesia can be continued evenly while the tracheotomy is completed. Recent studies on the harmful results of anesthesia anoxia serve to emphasize the importance and value of administering oxygen throughout the operative procedure.

MATHIAS J SEIFERT, M D

SURGICAL INSTRUMENTS AND APPARATUS

Hirshfeld, J W, and Laube, P J Surgical Masks
Surgery, 1941, 9 720

Surgeons have attempted to prevent contamination of wounds with bacteria of the nose and throat by the use of masks, since the suggestions of Mikulicz, and, most recently, by attempts to destroy the bacteria after they have left the upper respiratory passages through the use of bacteriocidal ultra-violet radiation. In the literature there is a great similarity of opinion that masks are of value. There is some discrepancy of opinion, however, as to which type of mask is the most valuable. Especially since the work of Wells on infection by droplet nuclei, which has changed the general concept of contagion, have the effects of masks been worthy of review from a bacteriological standpoint. The authors have, therefore, constructed an airtight cabinet into which the test subject places his head, and from which bac-

teriological studies can be carried out both by the Petrie-dish method, and by the bacteriological centrifuge devised by Wells. The air within this cabinet was sterilized by the use of ultra-violet radiation so as to eliminate the factor of adventitious bacterial contamination.

The tests were made with the subject breathing quietly without a mask for fifteen minutes, without a mask and talking, quiet breathing with a mask, and talking with a mask. A variety of masks were used, both the pervious gauze types and the cellulocotton insert types, as well as the deflection types of masks containing cellophane or celluloid. The staphylococcus albus and aureus, micrococcus catarrhalis, streptococcus non-hemolyticus and viridans, diphtheroids, gram-positive aerobic bacilli, and other bacteria were recovered.

The authors found that quiet breathing without a mask resulted in but little contamination, while talking greatly increased it. A rather surprising finding was that masks increased the number of bacteria in certain instances in quiet breathing. Indirect contamination was increased in 69 per cent of the tests by the use of the masks in quiet breathing, while direct contamination was increased in 62 per cent. On the other hand, masks were able to reduce the number of bacterial colonies during talking to a reasonable level. Surgical masks reduced direct-spray contamination in 89 per cent of the tests. No significant differences were noted when the masks were worn from one to four hours preceding the tests. Industrial respirators were also tried, and they were found to be even more effective than the surgical masks in preventing contamination.

The clinical significance of these findings would suggest that talking in the operating room should be restricted. Surgical masks are not as efficient as industrial respirators probably because they fit more snugly to the face, but the latter possess the drawback of great discomfort.

WILLIAM C BECK, M D



PHYSICO-CHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Westmark N. A Roentgenological Investigation of Traumatic Lung Changes from Blunt Violence to the Thorax. *Acta radiol.* 94 22 33

Traumatic changes of the lung from blunt violence to the thorax may be produced by a direct lesion to the lung or pleura from a fractured bone which has been forced into the thorax. This may give rise to a pneumothorax or hemothorax or both intermuscular and subcutaneous emphysema interstitial or interalveolar hemorrhages and interstitial emphysema. The latter may extend into the mediastinum and neck. The characteristic feature of these changes is that they always proceed directly from the local lesion in the lung.

Traumatic lung changes such as laceration and hemorrhages due to blunt violence may also occur without a direct lesion to the lung or pleura. Evidence of damage to the chest wall. The rationale of such effects and the pathological changes accompanying them are discussed at some length. At times rupture of the bronchi may lead to interstitial emphysema extending to the mediastinum or neck, or if the peripheral alveoli are ruptured a pneumothorax may arise. Embolism may also result from such injuries. Some of the changes may cause few or no clinical findings but quite often they give rise to acute or chronic bronchitis, bronchiectasis, pneumonia, lung gangrene, pleurisy or emphysema because of secondary infections from bacteria in the respiratory tract.

The early diagnosis of traumatic lung changes from blunt violence is important in order to prevent if possible a relatively late later complications or in order to establish their traumatic origin if such principles are involved. Roentgenology offers especially favorable means of making such diagnosis. Comparatively few cases of this nature have been reported in the roentgenographic literature some of which are cited by the author. In order to study the incidence and the roentgen appearance of such changes he reviewed 124 such cases which came under his observation. Of these 56 showed signs of fractured ribs, in 3 others there was evidence of a fractured sternum and in 1 revealed a fractured vertebral body in the thoracic region. Roentgenographic changes were present in 94 cases, of which 5 showed signs of fracture. In by far the great test number of cases the pulmonary change were of a bilateral character even when fractures were present only on one side. The findings are classified according to whether they were probably caused by direct lesion of the lung or pleura by a fractured bone or whether no such direct connection was demonstrable. They are described in detail and interpreted in terms of the various pathological processes previously mentioned. Various criteria for the differential diagnosis from

coincident or pre-existing pulmonary lesions are given consideration.

The present investigation has shown that traumatic pulmonary changes arising through blunt violence to the thorax could be verified by roentgenography immediately after the accident in 75.8 per cent of all the cases. Among the cases in which there was evidence of actual rupture of the chest roentgenographic lung changes were observed in 86.7 per cent and among the cases with no such signs roentgenographic changes in the lung were found in 65.6 per cent. The pulmonary changes as evidenced by roentgenography cleared up after two or three weeks in 53.2 per cent of the cases. In the cases the changes generally gave rise to no symptoms and were of slight significance. In 46.8 per cent more or less severe lung complications occurred such as pyemia, pneumonia and bronchitis. Such complications generally occurred within a period of from four to fourteen days after the accident. As a whole the cases showed no clinical signs of pulmonary disease before some complication set in. ADOLF HARTUNG M.D.

Doub H P and Jones H C. The Roentgenological Diagnosis of Tumors of the Small Bowel. *Am J Dig & Dis.* 94 8 49

The diagnosis of tumors of the small intestine is based on the correlation of the history and physical and laboratory findings with the roentgen findings, especially by evaluating the degree of impairment of the bowel function.

The authors discuss the tumors separate them under two major groups benign and malignant. The most common is the jejunal segment where they are considered together.

Benign duodenal tumors. Of a series of 33 cases histologically verified tumors of the small intestine 8 were benign, 3 of these occurred in the duodenum. Adenoma, myoma and fibromas are the most common tumors, whereas aberrant pancreatic tissue, hemangiomas, lipomas, enteric cysts and neuroblastomas are rare and because of lack of any specific clinical manifestation are discovered accidentally.

The symptomatology is collected from the literature and depends upon the mechanical disturbance produced on the bowel function which results in partial or total obstruction, intussusception. The patients are usually young and the clinical course is usually longer than in malignant tumors. In the beginning the only clinical manifestation may be epigastric or right upper quadrant pain which often characterized by a periodicity suggesting duodenal ulcer. Later nausea and vomiting follow a gradually increasing severity as the degree of obstruction increases. Dehydration, alkalosis, prostration and weight loss represent further signs of advanced functional disorder. Some patients suffer from

diarrhea alternating with constipation, and tarry stools may be noted. As a result of this the red-blood-cell count and hemoglobin may be reduced to 50 per cent of their normal values, a fact which is especially suggestive of myoma or malignancy.

Malignant duodenal tumors. The duodenum is more frequently involved by carcinoma than any other segment of the small bowel. As a rule it forms the site of 3 per cent of all malignancies of the gastro-intestinal tract. The ileum is next frequently involved and the jejunum least. There are 3 main forms assumed by carcinoma of the duodenum: (1) constricting, (2) infiltrating ulcerative, and (3) polypoid. The size of the tumors may vary from a few millimeters in diameter to the size of a grapefruit. Histologically, the tumors may be adenocarcinomas, or medullary, scirrhous, or colloid carcinomas, the first predominating.

In the authors' series of 25 malignant tumors of the small bowel, 13 were carcinomas of the duodenum, 15 per cent were located in the supra-ampullary and infra-ampullary portions, respectively, and 70 per cent in the peri-ampullary portion. The differential diagnosis includes carcinoma of the pylorus, duodenal ulcer, pyloric tumor herniating into the duodenum, cancer of the head of the pancreas, gastromesenteric ileus, duodenal dilatation due to adhesions, and acute gall-bladder disease.

Sarcoma of the duodenum may occur, but is very rare.

Röntgen findings in duodenal tumors. The roentgen findings in benign lesions differ very little from those seen in malignant lesions. Partial or complete obstruction may be encountered. If encroachment on the lumen is bilateral and symmetrical, and the obstruction is complete, the lower end of the barium column is conical and the bowel above is dilated. If the growth is unilateral, there is asymmetrical narrowing. Occasionally there is a filling defect suggest-

ing an ulcer niche. There may be six-hour gastric retention.

Tumors of the jejuno-ileal segment. The symptoms of both benign and malignant tumors of the jejuno-ileal segment are similar. As a rule they are dominated by the manifestations of intestinal obstruction. Adenomas, myomas, and fibromas are the most common benign tumors, whereas the malignant tumors fall into two main categories: carcinomas and sarcomas. Raiford has tabulated the differentiating signs of the two latter as given below.

Carcinoid tumors. These tumors are found throughout the gastro-intestinal tract, most frequently in the appendix and small bowel. They originate from argentaffine cells of the normal intestinal mucosa and develop in the submucosal layer. Unless they lead to obstruction, there is nothing unusual about their pattern, so that diagnosis is very difficult.

T. LEUCUTIA, M.D.

RADIUM

Teahan, R. W. The Treatment of Carcinoma of the Breast by Interstitial Irradiation. *Am. J. Roentgenol.*, 1941, 45: 567.

After a brief historical review of the interstitial radium treatment of carcinoma of the breast, and special consideration of the method of Keyes, the author presents his own similarly treated series of 68 cases since 1933.

The cases were divided into 5 groups, as follows:

Group I. Cases in which there was a lump in the breast, without palpable lymph nodes.

Group II. Cases with a lump, with palpable nodes in the axilla.

Group III. (a) Cases with a lump in the breast, with palpable nodes in the axilla and the supra-clavicular area, (b) with a lump adherent to the skin or the chest wall, and (c) with a lump, with distant metastasis.

Group IV. Postoperative recurrences.

Group V. Cases given prophylactic irradiation.

The results obtained are shown in the following table.

TABLE II—SUMMARY OF CASES

| | Group I | Group II | Group III | Group IV | Group V | Total |
|--|---------|----------|-----------|----------|---------|-------|
| No. of patients living and well | 10 | 11 | 11 | 0 | 1 | 33 |
| No. of patients who died of carcinoma | 0 | 0 | 20 | 3 | 0 | 23 |
| No. of patients who died of intercurrent disease | 1 | 1 | 4 | 0 | 0 | 6 |
| No. of patients who were killed in accidents | 0 | 0 | 0 | 1 | 0 | 1 |
| No. of patients who died under unknown circumstances | 1 | 0 | 0 | 0 | 0 | 1 |
| No. of patients living with carcinoma | 0 | 1 | 3 | 0 | 0 | 4 |
| | 12 | 13 | 38 | 1 | 1 | 65 |

TABLE I—DIFFERENTIATION OF CARCINOMAS AND SARCOMAS

| | Lymphoblastoma | Carcinoma |
|---------------------|---|---|
| Age | Young, usually the fourth decade, may occur in infants | Attacks persons in cancer age, usually fifth or sixth decades |
| Location | Most common in lower ileum and cecum | Most common in stomach or rectum |
| Course of Disease | Rapid | Prolonged |
| Obstruction | Late or not at all | Commonly found |
| Laboratory Findings | Blood in the stools rare, rise in temperature in afternoon, anemia severe | Blood in stools common, no rise in afternoon temperature, anemia moderate |
| Gross Form | Large aneurysmal dilatation | Small annular constriction |

In Table II which appears in the original article all of the author's 68 cases are individually summarized.

The technique of procedure consisted in the implantation of two types of platinum radium needles: one type 44 mm. long and containing 2 mgm. of radium and the other 60 mm. long and containing 3 mgm. of radium, both being of 0.8 mm. wall thickness. It is desirable to have available for each patient about 12 of the 2 mgm. and 30 of the 3 mgm. needles.

The longer needles were implanted first around the primary focus and toward the axilla. They were placed parallel at a distance of 1.5 cm. from each other on a plane just beneath the tumor as a rule in two rows with the points slightly overlapping. The smaller needles were implanted in the intercostal spaces near the insertion of the ribs around the lower periphery of the breast and in the infraclavicular and supraclavicular fossae. The implantation was done under nitrous oxide and oxygen anesthesia after preparation of the skin with iodine and Richardson's solution. The needles were threaded with flexible monel metal wire and these wires were tied together in groups before dressing was applied. The greatest number of needles used at one time was

59 and the greatest quantity of radium 134 mgm. The needles were left *in situ* for a period of from 120 to 313 hours and the total dose varied between 845 and 32,329 mgm.-hrs. In 9 cases the treatment was repeated.

After a discussion of the reaction post irradiation course, accidents and complications, the author considers the following to be advantages of the interstitial radium treatment: (1) the breast portion of it may be saved; (2) the risk of procedure is less than in radical operation; (3) the carcinoma may be destroyed in some inoperable cases; (4) the method may be used when radical operation is refused; and (5) the treatment may be repeated. The following are disadvantages: (1) homogeneous irradiation is impossible in bulky breasts and in axilla; (2) a longer period of hospitalization and convalescence is required than in radical amputation; (3) radiation fibrosis often causes marked limitation of arm movement; (4) closer follow-up is necessary for the detection of recurrences; and (5) the retraction of the breast and telangiectasis of the skin may produce more disfigurement than an operative scar.

A bibliography of 49 articles is appended.

T. LECCURIA, M.D.

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Walker, G F Injury and Internal Disease *Brit Med J*, 1941, 1 659

The literature is briefly reviewed as regards the relation of injury to cancer, organic nervous disease, myocardial and pericardial lesions, diabetes, tuberculosis, leucemia, appendicitis, peptic ulcer, pneumonia, and syphilis. Mental after-effects of head injury and injury to bones and joints are also reviewed. Various case records reported in the literature are mentioned. The bibliography is of interest.

The author points out that practically all internal diseases have on occasion been attributed to injury, that much plagiarism and uncritical acceptance of authority have occurred, that much flimsy evidence has for years been copied from book to book, and that there is often a hopeless conflict of opinion between pathologists and clinicians.

WALTER H NADLER, M D

Verneti, L Vitamins and the Reticulohistocyte System in the Healing Process of Wounds (Vitamine e sistema reticolo istiocitario nel processo di guarigione delle ferite) *Arch ital di chir*, 1940, 59 362

The results of the investigations of a number of authors show that the vitamins possess to a high degree the capacity of stimulating the repair processes of the tissues and that the reticulohistocyte system assumes great importance in the normal evolution of the repair processes of wounds in any organ or tissue. As recent acquisitions suggest the presence of a functional relationship between vitamins and the reticulohistocyte system, Verneti has undertaken a series of experiments on rabbits to study the behavior of this system during the healing process of cutaneous wounds subjected to intense treatment with cod-liver-oil ointment. He used 6 pairs of rabbits in which he produced rather large granulating wounds of the back, 1 animal of each pair was dressed with a 50 per cent sterile ointment of cod-liver oil and the other with plain gauze, and the pairs were killed from four to twenty-five days after the intervention. In this series, a 1 per cent trypan-blue solution was used to obtain vital staining of the elements of the reticulohistocyte system, 2 cc per kgm of weight being injected intravenously on the day of the intervention and then every other day. The vital staining was controlled in another group of rabbits in which 10, 12, or 15 cc of a saturated solution of lithium carmine were injected intravenously on the day before the experiment ended.

The wounds treated with cod-liver oil presented greater activity of the proliferating processes of the cells than those of the controls, this was evidenced macroscopically by the more abundant production

of granulating tissue and the earlier tendency of the wound to decrease in size and cover itself with epithelium, and histologically by earlier organization of the newly formed tissue. The reticulohistocyte system, which in the controls showed marked participation in the formation of granulation tissue and later in the formation of the final scar, intervened much more actively in all the various processes of the wounds treated with cod-liver oil. The influence of the vitamin treatment was shown especially by the intense mobilization of the histocyte elements which, charged with a large number of granules, formed the new tissue nearly exclusively and changed rapidly from cells of embryonic type into young fibroblasts, which gradually acquired more adult characteristics, became elongated, and lost a large part of their protoplasm. The observations made in the second group of rabbits corresponded to those of the first group, and both series of experiments confirmed the relationship existing between the reticulohistocyte system and the vitamins.

RICHARD KEMEL, M D

Cortese, G Clinical and Experimental Contribution to the Study of Bursitis, with Special Attention to the Etiopathogenetic Problem (Contributo clinico e sperimentale allo studio delle borsiti mucose con particolare riguardo al problema etiopatogenetico) *Arch ital di chir*, 1940, 59 237

Three principal forms of bursitis are recognized (1) chronic serous, or hygroma, which is the most frequent, (2) chronic proliferating, and (3) chronic hemorrhagic. Tuberculosis, traumatism, diatheses, disorders of metabolism, and focal infection are the conditions most frequently involved, and among these, tuberculosis and traumatism are the most common.

Cortese describes 8 cases, which he has studied during the past three years, and reports an experiment on rabbits in which he injected blood in the bursa at the back of the tibiotarsal joint to determine the subsequent macroscopic and microscopic changes. The bursa remained more or less swollen during the observation period of from twenty to forty days. Their internal aspect was whitish and uneven because of small papillary and cord-like elevations. In spite of marked variations in structure, it was easy to distinguish in the wall of the bursa an external, thick layer of connective tissue with mostly parallel bundles of fibers between which interstitial hemorrhages and numerous newly formed capillary and precapillary vessels could be observed in various parts, small inflammatory foci were frequently found in contact with these vessels, some of which were partially or completely thrombosed. The internal layer consisted of interrupted, flat cells which could not be compared to an endothelial lining and were surrounded by a more or less

abundant zone of intercellular substance largely homogeneous in some places they were pushed toward the cavity by fibrous rarely fibrovascular cords which came from the subcutaneous layer

The results of his clinical and experimental observations allow Cortez to furnish some data on the etiology pathogenesis and significance of chronic bursitis. All his efforts to establish the tuberculous nature of the disorder have failed. In addition, no case of hygroma was discovered among the numerous patients with surgical tuberculosis studied at his clinic and the 8 reported cases of bursitis healed by first intention although the contents of the bursa in 4 cases were spilled at operation. As there is a tuberculosis of the bursa it is necessary to discriminate between non-specific and specific chronic bursitis. In 6 cases there was a history of a single direct or indirect more or less violent traumatic preceding the appearance of the bursitis but from one to twelve months a mechanical and chemical irritative action must be attributed to the hemorrhage in these cases as shown by the results of the previous experiments on rabbits.

The author also investigated the absorption capacity of the bursa after partial emptying of the sac he injected 2 c.c.m. of urselectan B and found that this substance caused no immediate or late signs of irritation the image of the bursa was well marked for about ten minutes and then began to fade until it disappeared completely in about one hour. This also occurred in joints and demonstrated that synovial linings and mucous membranes have the same structure and function.

The study of pathological and normal bursae has convinced Cortez that they have no epithelial lining. The principal lesion of bursitis consists of a degeneration of the connective tissue of its wall. This process begins in the fundamental substance the fibers of which gradually break up and dissolve and in addition the cell secondarily dissolved fibers and the liquefaction product of the fundamental substance form the typical contents of the hygroma. The findings suggest mucous degeneration.

RICHARD KEMEL, M.D.

Schaumann J and Hallberg V. Koch's Bacilli Shown in the Tissue of Lymphogranulomatosis Benigna (Schaumann) by Means of Hallberg's Staining Method. *Acta Med Scand* 1941; 7: 499.

The tuberculous nature of lymphogranulomatosis benigna is strongly supported by the frequent appearance during its course of bacillary tuberculo and especially by the simultaneous disappearance of the lymphogranulomatosis (Schaumann 1922). Lemming made some interesting research into positive energy carried out by means of injecting patients with benign lymphogranulomatosis with BCG vaccine. The absence or the paucity of bacilli in the tissues of this type of patients is in the authors' opinion related to the peculiar tuberculin energy present in these cases for this energy induces im-

munoallergic resistance to tubercle bacilli which impedes the growth of these bacilli and reduces their vitality or altogether destroys them.

The negative results obtained by inoculating guinea pigs with the gland in a section of which the bacilli were demonstrated therefore do not give rise to the assumption that the bacilli are special microorganisms which are very similar to Koch's bacilli. On the contrary they are in full agreement with the conception that the bacilli discovered are really Koch's bacilli and that lymphogranulomatosis benigna is a tuberculous disease.

SAMUEL H. KLEIN, M.D.

Goodwin L. G. and Findlay C. M. Absorption and Excretion of Sulfonamides Applied Locally. *Observations in Rabbits*. *Lancet* 1941; 40: 691.

Sulfanilamide, sulfapyridine and sulfathiazole were applied to uninfected wounds in rabbits and the rates of absorption and excretion were estimated. A dosage of 0.15 gm. per kgm. of body weight (corresponding to just over 10 gm. for an adult of 70 kgm.) was selected. In most of the experiments a portion of skin about 1 sq. in. in area was removed and the powdered drug spread on the surface of the muscles. In another series in addition to the skin wound portion of the extensor muscle of the thigh roughly the same size as the skin area was also removed. With wound of this size and with the dosage used it was possible to obtain a blood concentration of over 2 mgm. per cent for a short period with sulfanilamide. The other two compounds however were not absorbed rapidly enough for this level to be reached. Sulfanilamide was excreted rapidly, sulfathiazole more slowly and sulfapyridine still more slowly. About 90 per cent of the excreted sulfanilamide was in the conjugated form as compared with 75 per cent of the excreted sulfathiazole or sulfapyridine.

WALTER H. JADLER, M.D.

Jung W. The Operative Treatment of Elephantiasis (Die operative Behandlung der Elephantiasis). *Beitr. Klin. Chir.* 1940; 44: 549.

The author summarizes his experiences for 15 years in Liberia. After a criticism of the previous classifications he shows that elephantiasis is to be divided into two forms: (1) the cylindrical (uniform) which may be edematous or acute and fibrous and (2) the irregular which may be fibrous, lobular or bulbous.

In the edematous cylindrical form preoperative treatment with baths, massage, bandaging and last stockings is essential and gives good results. The chief purpose of these measures and of operation is to create new lymphatic channels. In all other cases especially in the fibrous cylindrical form it is necessary in addition to remove a much as possible of the elephantiac tissue. For typical elephantiasis of the lower leg the author uses a longitudinal incision that is Y-shaped above and below. He then

dissects out two very large longitudinal masses of elephantiac subcutaneous tissue and leaves one-third of the skin on the back of the calf in contact with the subjacent structures. He removes the tissue down to the deep fascia, and in the fascia cuts a large number (perhaps 25) of windows which are slightly larger than postage-stamps. Through each of these windows, he places a doubled silk suture which he passes deep into the muscle tissue with a needle. The protruding ends of the silk threads are so arranged as to act as wicks and draw lymph from all possible regions of the leg, deep into the muscles. The flaps are narrowed to fit the reduced circumference of the leg, and are closed with drainage. The skin must be smoothly applied over the leg, without tension. This is facilitated by the use of several catgut stitches through the skin and into the muscles.

The irregular forms of elephantiasis require other types of incision, the removal of nodules, and the closure of skin defects with Thiersch grafts. The latter procedure is particularly advisable on the foot, after careful excision of the damaged tissues. In the thigh, the base of the flaps is placed along the saphenous vein, in order to protect the veins and lymphatics. If the entire limb is involved, the leg is operated upon, then the foot and, finally, the thigh.

In 26 cases which the author was able to follow up for most of the time, there were 3 recurrences, in 1 of these the operation had not been worth while. There were about 30 other cases which could not be followed up. Six schematic drawings of the operation accompany the text. Unfortunately, the photographs were confiscated from the author by the British (GOEBEL) LEO M. ZIMMERMAN, M.D.

Bailey, A. A., and Moersch, F. P. Phantom Limb
Canadian M. Ass. J., 1947, 45 37

"Phantom limb" is a term which is used to designate the sensation of feeling the presence of an extremity following its amputation. Phantom syndromes also may occur following the amputation of a breast or penis, or following the extraction of a tooth. Phantom limb is of more than casual interest, since the associated pain and dyesthesia may incapacitate the patient and in some instances lead to drug addiction or suicide.

The authors' paper was based primarily on a clinical study of 55 cases in which the patients registered at the Mayo Clinic for the sole purpose of obtaining relief of this syndrome. To facilitate the analysis of the findings these cases were designated as Group 1. In an effort to obtain additional information regarding the incidence and cause of this syndrome and the severity of the associated dyesthesia, the authors made a follow-up study in 50 cases in which patients had undergone amputation of a limb at the clinic. These were designated as Group 2. This follow-up study revealed that this syndrome followed amputation in 43 of the 50 cases.

The cause of phantom limb has received less attention than the treatment. The syndrome has been

attributed to many different causes, but this study disclosed certain etiological trends.

The incidence according to sex is not of much significance, as males are more subject to trauma and vascular disease than are females. Other frequent causes of amputation are tumors, infection, and a miscellaneous group of conditions including congenital anomalies. The last named causes affect the two sexes nearly equally.

The incidence of phantom limb according to age is scarcely worthy of comment. As might be expected, most of the patients in each group of cases were between thirty and sixty years of age.

The condition which necessitated the amputation is of some significance. Trauma was the cause in 43 of the 55 cases in Group 1. In the remaining 12 cases in this group the causes of amputation were as follows: infection in 5 cases, tumor in 4, and vascular diseases in 3. In Group 2 the causes of amputation were as follows: vascular disease in 20 cases, trauma in 7, infection in 7, miscellaneous conditions in 6, and tumor in 3. In Group 1, that is, cases in which the patients came to the clinic solely for the relief of pain in the phantom limb, trauma was the cause of the amputation in 43, or 78.1 per cent, and vascular disease was the cause in 3, or 5.4 per cent. In Group 2, that is, cases in which a limb was amputated at the clinic, trauma was the cause of the amputation in 13, or 26 per cent, and vascular disease was the cause in 25, or 50 per cent. The reversal of these two conditions as the predominating cause of amputation in the two groups of cases is not difficult to explain. In most cases in which amputation of a limb is necessary following an accident, the amputation is performed in a hospital near the scene of the accident. On the other hand, a considerable number of patients who have peripheral vascular disease are referred to the clinic for treatment.

The upper extremity was the site of amputation in 36 of the cases in Group 1, and the lower extremity in 19 cases. In Group 2 the upper limb was the site of amputation in 12 cases and the lower limb in 31 cases. The predominance of the lower limb as the site of amputation in the cases in Group 2 was to be expected, as vascular disease was the most common cause of amputation in this group of cases.

A neuroma could be palpated in about 20 per cent of the cases in Group 1. In evaluating the etiological role of neuroma it is interesting to note that in the cases in Group 1 removal of the neuroma was followed by relief of the symptoms in less than half of the cases in which the procedure was employed.

The possibility that the incidence of phantom limb is greater among neurotic persons than it is among normal persons is difficult to evaluate as the symptoms produced by an amputation are likely to bring out neurotic tendencies in a relatively stable individual. Neurotic manifestations were noted in 19 of the 55 cases in Group 1.

A patient suffering from the syndrome known as "phantom limb" usually relates that following the amputation of a limb he becomes conscious of a

sensation of the presence of the lost limb and that pain in the stump or in the distal portion of the lost limb soon becomes unbearable. In addition to the symptoms the painful stump may be exceedingly hypersensitive and there may be annoying spasms or jerking of the stump.

In 42 cases in Group 1 the syndrome had been noted immediately after the amputation in the remaining 13 cases the time that had elapsed between the amputation and the appearance of the syndrome was as follows: less than one month in 5 cases from one month to one year in 3 cases and more than a year in 5 cases. In many cases the patients had experienced the sensation of the presence of the lost limb intermittently for several years before the occurrence of distressing symptoms. In 4 cases in Group 1 the sensation of the presence of the lost limb had been experienced intermittently for twelve, twenty-five, twenty-seven and twenty-nine years respectively before the patients came to the clinic but in the majority of cases the average time that had elapsed since the operation was less than five years. This illustrates how rapidly pain becomes a real problem. In 12 cases some symptoms had been present for from five to ten years before the patients came to the clinic. In 4 cases symptoms had been present for from ten to twenty years and in 6 cases they had been present for more than twenty years.

The pain usually is said to be of a burning, aching or cramping type. Many patients said that the pain had a crushing, twisting, grinding, tingling, tearing or drawing quality. Some patients experienced the feeling of the presence of a tight wire like band around the phantom limb. Others experienced a prickly sensation as though needles were sticking in the phantom limb. In some cases the phantom limb felt numb. In several cases the patients experienced one of the following sensations: (1) that the fingers on the phantom limb were being twisted out of shape and (2) that the thumb was being pushed through the palm of the hand. When such sensations were present the patients experienced great difficulty in changing the position of the fingers of the phantom limb. One patient said that this difficulty increased with time. One patient felt as though the nail of the fingers of the phantom limb were being lifted from the nail beds. In 15 cases the pain interfered considerably with sleep.

In far more than half of the cases the patients said that the pain had been present constantly but had varied in intensity.

In 8 of the cases in Group 1 the patients said that the pain was aggravated by changes in the weather. The climatic influence was noted in 21 of the cases in Group 1.

In a few cases the patients said that the pain was worse on days when they were excited or fatigued than it was on days when they were calm and refreshed. Some patients noticed a decrease in severity of the symptoms when they were occupied.

The stump was the site of some distress in most of the cases. About 10 per cent of the patients were

bothered by spasm or jerking (so called choreiform movements) of the stump. In half of the cases the stump was tender or hyperesthetic. In a number of cases especially in cases in which a neuroma was present in the stump pressure on the stump produced shooting pain in the phantom limb. The tenderness and hypesthesia were independent of the presence or absence of a neuroma.

In the cases in Group 1 many of the patients had obtained relief with various types of treatment but ultimately came to the clinic because of incapacitating symptoms. The authors hastened to add that their results were no better than those obtained before the patients came to the clinic. Fifteen different types of treatment were employed either at the clinic or before the patients came to the clinic. The patients obtained scarcely more than temporary relief of symptoms. In evaluating the results of the different types of treatment we shall not attempt to distinguish between the treatment used at the clinic and that employed before the patients registered at the clinic.

Injection of alcohol into the nerves and into a neuroma in the stump produced some relief temporarily in 4 cases but in 5 other cases in which this procedure was employed it did not produce any relief whatever. The results of injection of a solution of procaine hydrochloride into a neuroma and infiltration of the brachial or sacral plexus were no better than the results of the injection of alcohol. In a case in which the syndrome had followed the amputation of a lower extremity the use of spinal anesthesia to produce sensory anesthesia to the level of the nipple did not result in immediate relief.

Some form of plastic operation on the stump was performed in 13 cases. Slight improvement resulted in 1 case but this was only temporary. In more than half of the cases in which a neuroma was removed the procedure did not relieve the symptoms. In the remaining cases in which the procedure was employed the benefit was only temporary. Removal of a neuroma, injection of alcohol about the nerve endings and anastomosis of the nerve endings also produced indifferent results. In some cases an exploratory operation was carried out on the brachial plexus and sympathectomy, rhizotomy or cordotomy was performed but the patients obtained only temporary relief. In 1 case roentgen therapy was applied to the spinal cord and to the root of the spin I nerves but the treatment did not produce any relief.

Application of physiotherapy to the stump relieved the symptoms for a short time in some cases but in others it did not produce any relief. In 1 instance it proved satisfactory when used every three or four months.

The authors mentioned some aspects of the problem of phantom limb which defy explanation on the basis of any single theory. For example pressure on the stump either in the absence or presence of a palpable neuroma may cause shooting pain in the absent extremity. On the other hand pressure upon

the sciatic nerve several inches above the stump occasionally stops the pain in the phantom limb and at the same time causes the "sensory ghost" to disappear. It is difficult to understand why slight pressure on the nerve may bring about temporary relief in 1 case but cutting of the sciatic nerve in another case does not result in permanent freedom from the symptoms. This to the authors' minds confounded all explanation of the pain on the basis of peripheral or central excitants.

Enough was said to indicate that treatment must be directed in a strictly psychological manner. It may include the use of some surgical procedure in rare instances. For example, the authors believed that a tender painful neuroma of the stump should be removed.

Dodd, H., Heekes, J. W., and Geiser, H. Progressive Postoperative Gangrene of the Skin. *Arch Surg*, 1941, 42: 988.

Three new cases of progressive postoperative gangrene of the skin are reported. The cases published since 1935 are abstracted and a table of all cases found in the literature is given.

The characteristic features of progressive postoperative gangrene of the skin as described in the literature and observed by the authors are:

1. Steady progressive destruction of the skin and subcutaneous tissue, but not of the muscles, fascia, or deeper structures. It usually begins in the stitch holes and progresses until the entire trunk is denuded of skin unless death or suitable treatment intervenes.

2. Great pain in the gangrenous edges of the wound, with a fair constitutional condition, although there is moderate variable pyrexia.

3. The simultaneous occurrence of streptococcal and staphylococcal infection.

4. The fact that all treatment, including administration of vaccines and serums, with the exception of the cautery, is useless.

Emphasis is laid on the need for early diagnosis.

It is concluded that the best treatment for postoperative gangrene of the skin is prompt excision of the edges of the wound with the cautery. Another successful remedy is the introduction of maggots into the wound, as described by Holman. Skin grafting accelerates healing.

SAMUEL H. KLEIN, M.D.

Basile, A. Is Surgery Justified in the Treatment of the Thymus for Pseudoparalytic Myasthenia Gravis? Clinical and Experimental Studies (È giustificato il tentativo d'intervenire chirurgicamente sul tumore nella miastenia gravis pseudoparalitica? Studio clinico e ricerche sperimentali). *Arch Ital di chir*, 1940, 58: 291.

Surgery offers some therapeutic hopes in the treatment of the complex clinical syndrome of myasthenia gravis pseudoparalytica since Sauerbruch successfully treated a woman suffering from this condition by removing a hyperplastic thymus gland. The thymus theory as to the pathogenesis of this

syndrome was first suggested by Laquer and Weigert in 1901 on the basis of personal observation of a tumor of the thymus associated with a severe form of the disease. Lievre reported a series of 68 cases of myasthenia gravis, in 57 of which autopsy showed either neoplasm or hyperplasia.

After a description of the brief and contradictory literature on the experimental pathology of this condition the author proceeds to discuss his own contributions. The purpose of the author's studies was to determine a functional relation between the thymus and the striated musculature, and to see whether it is possible to induce changes in the muscle tissues similar to those found in myasthenia gravis pseudoparalytica.

In one group of experiments the author fed or injected thymus tissues and extracts into dogs, in these dogs the muscle tissues were examined histologically and the phosphorus content of the muscles was noted. In a second series the thymus gland was removed surgically from pigeons and the muscles were then studied microscopically and biochemically for their phosphorus content.

The majority of the animals fed fresh thymus tissue by mouth showed a definite improvement in muscular function, there was an improvement in the general condition and in weight, the animal became more agile and more resistant to fatigue. There was also an increase in the muscle phosphates. Particularly interesting was the increased capacity for phosphorus synthesis. Histological examination of these dogs showed an increase in the perinuclear sarcolemma. Only 1 of these dogs showed an unusual reaction inco-ordination of movements with final paresis. This animal's capacity for phosphorus synthesis fell from 82 to 33 per cent, and microscopic study showed serious degenerative changes in the muscle tissues.

The pigeons from which the thymus gland had been removed were in a state of torpor and diffuse tremor. They also displayed a disturbance of phosphorus metabolism, especially of phosphorus synthesis.

The author believes that there is undoubtedly a correlation between the thymus gland and striated muscle tissue. Hypothymic function diminishes muscular activity, and hyperthymic function stimulates muscular activity. The author points out that clinical experience also indicates a correlation between the thymus gland and the function of striated muscle. These data justify the surgeon's attempt to treat this condition surgically.

JACOB E. KLEIN, M.D.

Herman, J. The Effect of Androgens and Estrogens on Spontaneous Benign Mammary Tumors in the Rat. *Am J Cancer*, 1940, 40: 343.

The effect of exogenous hormones on spontaneous benign mammary tumors was studied in a series of 94 female and 3 male rats. The period of observation of the animals extended from one to two years and was continued in all cases until death. The

tumor and host were then given a necropsy examination. It was noted that tumors develop most frequently in breasts rarely suckled by the young and it is believed that absence of nipple stimulation followed by duct occlusion and hormonal action is a factor in initiating changes leading to neoplastic growth. The morphological tumor types were adenofibroma (70 per cent), adenoma (16 per cent), cystadenoma (6 per cent), and fibroma (8 per cent).

Several series of experiments were done. In the first series the original spontaneous tumors were removed and autotransplants or homotransplants of tumor fragments weighing 0.3 gm. were introduced in both the axillae and groins of the same animal subcutaneously. From 1 to 4 of these implants grew in all animals after a latent period, the most rapid growth occurring usually at the primary tumor site. When the autotransplants reached a certain size they were removed and small fragments were reimplanted in the same animals. Such serial autotransplants were repeated from two to five times. No pronounced morphological changes were observed in the transplants as compared to the primary tumor. Homotransplants of spontaneous adenofibroma retained the morphological features of the primary tumor only if the recipient had originally had a spontaneous adenofibroma. In the animals originally having fibromas the same homotransplant lost the glands and were transformed into fibromas resembling the original excised tumor. With certain exceptions the reverse was not true since fibromas remained fibromas in animals from which spontaneous adenofibromas had been removed.

In a second series of animals bearing spontaneous tumors or with autotransplants or homotransplants estrogen was administered after removal of the original tumors. After such treatment large spontaneous tumors showed no morphological change. The autotransplants and homotransplants however grew more rapidly. The latent period was reduced and the morphology changed to that of a soft adenoma, cystadenoma, or papillary cystadenoma. The epithelial components of the excised tumors showed an increased proliferative capacity and a secretory phase was observed. Autotransplanted fibromas in rats treated with estrogens remained fibromas although these animals showed general effects of the estrogen treatment. Homotransplants of fibromas in treated rats from which spontaneous epithelial tumors had been originally removed showed a moderate growth of ducts and glands. Without injection as this did not occur. The possibility of latent epithelial elements in these fibromas must be assumed but since estrogen treatment alone does not cause the development of a growth factor must be present in the host. Homotransplants of epithelial tumors in treated rats from which spontaneous fibromas were originally removed developed into rapidly growing adenofibromas or adenomas. If the dose of estrogen was small with eventual elimination of its effect on the epithelial components gradually disappeared and the tumor became fibromatous.

These hosts lack hormonal or other growth factors for abnormal epithelial proliferation when the exogenous hormone is withdrawn. It appears that growth stimulating factors necessary for abnormal connective tissue growth are not identical with those necessary for abnormal epithelial growth. Estrogen evidently does not stimulate growth of mesodermal tissue but is an accelerator of the growth of specific glandular epithelium.

In a third series of experiments the animals were treated with androgens. A large spontaneous tumor showed no histological change. Autotransplants or homotransplants of adenofibroma did not grow in 30 per cent of these rats. In a few animals small hard fibrous tumors grew very slowly after a prolonged latent period. Thus androgens inhibit the epithelial portion of the excised tumors. When tumor growth was inhibited the ovaries were atrophic and fibrotic.

Both androgen and estrogen together or in sequence were injected in a fourth series of animals. Large spontaneous tumors did not grow. Early small spontaneous tumors and autotransplants and homotransplants all grew. The ratio of estrogen to androgen was 1:10 and in this ratio it appears that the stimulating effect of estrogen overcomes the inhibiting action of androgen.

The author concludes that estrogens stimulate and androgens inhibit the epithelial components of early spontaneous tumors and of autotransplanted and homotransplanted adenofibromas. The connective tissue components of these tumors are not directly affected by estrogen and are inhibited by androgens. The morphological changes occurring are illustrated by photomicrographs. In no instance did a true carcinoma develop.

JOHN L. LINDQUIST, M.D.

Woodhouse, D. L. The Chemodiagnosis of Malignancy. *Am. J. Cancer* 1940 40: 359.

This review comprises (1) a short summary of methods advocated by various workers for the chemodiagnosis of malignancy, (2) some general considerations pertinent to the subject of cancer serum tests, and (3) an account of the more recent serodiagnostic studies carried out at the Birmingham Center.

The numerous biochemical reactions proposed by various workers for the diagnosis of cancer may be classified into several groups.

Group I includes tests involving analyses for specific chemical constituents of the blood such as fibrin, calcium, magnesium, cysteine, lipins, and glutathione. Also included in this group are tests involving the precipitation of protein or other components from the blood. The latter tests depend on variations in buffer capacity and the relative amounts of albumin and globulin. A number of Group I tests are named and described.

The Group II biochemical tests are those which employ physicochemical methods to measure surface tension, pH value of the serum, the sedimentation rate, and the electrical resistance of cells.

In Group III(a) are reactions of the antigen-antibody type, and (b) reactions dependent on enzyme changes. The former tests utilize tumor extracts or embryonic tissues and involve the clumping of cells, flocculation, cytolysis, and cutaneous reactions, while the latter are based on lipolysis, proteolysis, and phosphatase estimations.

Group IV tests involve hormone assays, especially of the prolans excreted in certain types of malignancy of the genitalia. These tests are analogous to the biological tests for pregnancy such as the Aschheim-Zondek and Friedman tests. A number of tests falling into each group are named and described.

The general consideration of the problem of cancer serodiagnosis raises the question of whether or not there is a rational basis for such diagnosis. Up to the present time, with one or two special exceptions, it has been impossible chemically to detect a specific substance elaborated by malignant tissue. If such a substance were elaborated the comparatively huge mass of host tissue would make its quantitative detection difficult. The evidence at hand indicates that the difference between the malignant cell and the normal cell is a matter of growth that is not as yet translatable into terms of biochemistry. Unless there is some fundamental difference in their biochemical natures, "one would not expect the host to react against the malignant cell as though it were an alien, by the evocation of antibodies."

Nevertheless certain diagnostic tests are based on the assumption that some form of antibody defense mechanism may be elaborated in cancer. The experimental data supporting the assumption are mostly derived from observations on transplanted tumors, and it would be fallacious to attribute the same reactions to spontaneous cancer. It is known that animals may have a natural resistance or may develop an acquired immunity to certain types of transplanted tumors. The evidence indicates, however, that this immunity is not an anti-tumor immunity but an anti-protein immunity similar to species immunity.

Group I tests attempt to show changes in the constitution of the blood serum in malignancy. Such changes undoubtedly occur but are probably due to secondary effects of the disease such as anemia, toxemia, and the absorption of cell disintegration products. Similar changes are to be expected in non-malignant diseases. The same lack of specificity probably applies to the Group II physicochemical reactions. Group III(a) tests are highly speculative since the evidence for antibody production in spontaneous cancer is open to criticism. The assay of the urine for prolans in chorioepithelioma is an example of a Group IV test which is valuable in the diagnosis of that particular tumor. Other hormone assays, e.g., estrogens, have so far provided little help in this kind of diagnosis.

At the Birmingham Center special investigations were made of two tests which fall into Group III(b), based on enzyme changes. One of them, the Fuchs reaction, has given encouraging results, while the

other, based on lipolytic augmentation, has not. Another test investigated was the vanadate reaction. The methods of carrying out these tests and of evaluating their accuracy in diagnosis are described. The correspondence of the results of the tests with the clinical and histological diagnosis is the essential basis of their accuracy.

The lipolysis test, when done by the described technique, failed to show a specific diminished augmentation value for cancer sera. With the vanadate flocculation test the results corresponded with the clinical diagnosis of malignant or non-malignant disease in only 75 per cent of the cases and in the remaining 25 per cent the test gave an incorrect diagnosis.

With the Fuchs proteolytic reaction, the results of the tests were more accurate. This test was applied to the serum of patients with malignant and non-malignant diseases as well as to extracts of malignant and non-malignant tissue. In a series of 303 patients who had had no radiation therapy the correct result was obtained in 81.8 per cent, including malignant and non-malignant cases. Experience has shown that anomalous results are obtained when the test is applied to the serum of patients who have had radiation therapy. When the test was applied to extracts of histologically malignant tissue, 70 per cent of the extracts gave a correct reaction. In the case of non-malignant tissue extracts, 90 per cent of the reactions were correct.

Reviewing the results of the three methods, the author concludes that none of them has the specificity to afford the assistance desired. The fact that a high percentage of non-malignant cases gave false positive reactions is to be regretted. The Fuchs reaction gives the most encouraging results and it appears that the test is not without good foundation.

JOHN L. LINDQUIST, M.D.

Brockbank, E. M. Mule Spinner's Cancer. *Brit M J*, 1941, 1: 622.

Epithelioma of the skin occurs frequently in cotton mills among spinners, mostly in males over fifty years of age. The left side is involved in 80 per cent of the cases, presumably because of constant friction against the front bar along the machine in bending forward to piece threads. The primary cause is believed to be mineral oil, a known carcinogenic agent, which becomes sprayed on the spinner's clothes while he oils the machine and which he subsequently wipes off on the clothes about the hips to clean the fingers. In the hot workrooms the spinners perspire freely, thus washing off sebaceous gland secretions and allowing the oil to penetrate the skin. This is especially likely to happen in the scrotal area, which is likewise subjected to irritation from friction of the trousers during movements at the machine. Some observers believe that ichthyosis and neglect of soap and water cleanliness are accessory etiological factors. Brockbank believes this disease entirely preventable and offers the following prophylactic measures:

1 Regular periodic examination of the spinners by physicians trained to pick out early signs of epitheloma such as local ichthyotic thickening papillomas or warts 2 Immediate excision of these early lesions followed by roentgen or radium irradiation to prevent hopeless extension by the lymphatics into the groins 3 Substitution of safer oils or blends for the carcinogenic oils 4 Protection of the skin by the wearing of additional trousers or shorts 5 Careful washing especially of the scrotal region 6 Protective lanolin olive oil ointments for use by men over fifty and those who have a dry skin 6 Education of the spinners by distribution of pamphlets illustrating the lesions at stages suitable for removal.

EDWIN J. FULASKI M.D.

Johnson A. S. and Lombard H. L. The Estimation of Operative Risk in Patients with Cancer
New England J. Med. 1941 224 759

The authors studied the operative records of 2445 cases of major operations at the Massachusetts State Cancer Hospitals at Pondville (1927-1939) and Westfield (1937-1939) for the effect upon operative mortality of such factors as obesity malnutrition hypertension and cardiac history. In the study they used the criteria of Warren to define operative mortality: 1. patients dying within one month after operation were operative deaths provided the death was not due to the natural course of the condition for which the operation was performed. They also included a few patients surviving the arbitrary period of one month but who pursued a progressively downhill course. Fifty-five and eight tenths per cent of the patients were given an autopsy examination. Histories were relied upon for the remainder. The data are presented in a number of tables.

With a statistical approach the authors concluded that the most important factors influencing the operative mortality were age and the length of the operation. In the total of 386 deaths the causes of postoperative death listed in the order of their frequency were sepsis (40.3 per cent) pneumonia (26.1 per cent) cardiac failure (11.1 per cent) pulmonary embolism (7.5 per cent) hemorrhage (5.7 per cent) renal failure (3.1 per cent) surgical shock (4.0 per cent) and all other causes (1.3 per cent).

MARIAN BARNES M.D.

Kozdob A. Z. and Schwartz E. Y. The Result of Surgical and Combined Treatment of Patients with Malignant Tumors of the Kidney
I. J. Radiat. Oncol. Biol. Phys. 1941 6 485

The authors reviewed 1837 case histories of patients with malignant neoplasms.

In cancer of the kidney the best results were obtained from a radical operation followed by x-ray irradiation. The results of treatment were better in the upper lip than in the lower.

In cancer of the bladder the greatest number of three year and five year cures were obtained in a group of patients treated by means of radical cystectomy followed by roentgen therapy.

In cancer of the large intestine x-ray therapy and the formation of an artificial anus seemed to prolong the life of the patient.

The author emphasizes the importance of early diagnosis of malignant tumors.

JOSEPH K. NARAT M.D.

GENERAL BACTERIAL PROTOZOAN AND PARASITIC INFECTIONS

Vaccarezza R. F. and Gómez J. B. Pulmonary Pictures in the Extrapulmonary Forms of Tuberculosis (C. d. s. pulm. n. l. s. form. tra. t. r. á. c. i. d. l. tuberc. l.) 4. d. e. l. d. i. d. de pat. l. y. l. delat. b. l. s. s. 94 2 307

The clinical and roentgenological study of 420 cases of extrapulmonary tuberculosis in patients of all ages and presenting varying morbid conditions revealed the presence of pulmonary changes in 90.2 per cent of the cases. In 30 per cent the pulmonary lesions were of the residual type, mostly sequelae of the primary infection and of hematogenous dissemination in 54.8 per cent the pulmonary lesions were active and represented various dominating tuberculous processes such as an active primary complex, secondary infiltration, acute miliary tuberculosis, slight or chronic hematogenous dissemination, hematogenous dissemination with cavitation and ulcerofibrosis and fibrocystic tuberculous and in the remaining 5.4 per cent the lesions were active involvement of the lymph nodes from the primary pulmonary infection.

The hematogenous pulmonary lesions largely predominate in extrapulmonary tuberculosis 35.9 per cent of the patient had pulmonary lesions with clinical symptoms of a chronic character in most cases. Isolated extrapulmonary tuberculosis (limited to one organ or to an organ system) was found in only 47.8 per cent of the patients. In most cases extrapulmonary tuberculosis does not behave like isolated chronic organ tuberculosis; it has a tendency to give rise simultaneously or successively to localizations in other organic systems including the lungs. There is no antagonism between extrapulmonary tuberculosis and pulmonary lesions and the one type does not tend to exclude the other. On the contrary the association of the two localizations in space or in time is frequent. Although the pulmonary lesion is the one of the hematogenous type the ordinary forms of chronic pulmonary tuberculosis are not at all rare.

More complete knowledge of the hematogenous modalities of pulmonary tuberculosis and better study of the patients, especially the systematic roentgen examination of the lungs in conjunction with the improvements in the roentgen technique have all wed the recognition of a proportion of combined extrapulmonary and pulmonary tuberculosis which was predicted a few years ago and have thus displaced the concept of isolated chronic disease. The anatomical and evolutionary correlation between pulmonary and extrapulmonary foci does

not occur with sufficient frequency to favor its establishment as a law. Roentgen examination of the lung must be systematically performed and repeated in the cases of extrapulmonary tuberculosis; this clinical requirement is absolutely imperative. It is also necessary to make a systematic search for the tubercle bacillus in the sputum or in the gastric contents, even when pulmonary changes are not demonstrated roentgenologically, until this investigation has been made, it is advisable to consider the patient as infectious.

A search for extrapulmonary foci must be conducted systematically in patients having pulmonary tuberculosis, all the more so if the latter is of hematogenous origin. Roentgen examination of the lungs is capable of furnishing valuable data to support the tuberculous nature of an organic disorder of obscure or doubtful etiology; in a given case a negative result constitutes no proof against tuberculosis. In disorders in which the etiology is not sufficiently established, the frequent presence of hematogenous pulmonary lesions would seem to favor a tuberculous origin.

In all cases of extrapulmonary tuberculosis, it is necessary to determine and treat the original focus and the pulmonary and extrapulmonary metastases found. Extrapulmonary tuberculosis should not be treated without the intervention of the phthisiologist; in fact, the treatment should be conducted under the strict collaboration of the phthisiologist, surgeon, orthopedist, and specialist of the involved organ or system. For individual and collective reasons, patients with extrapulmonary tuberculosis should not be hospitalized in a general service, but should be placed in a specialized section. The so-called isolated chronic organic tuberculosis should be considered not as a local disease, but as a general disease capable of involving various organs.

RICHARD KEMEL, M D

EXPERIMENTAL SURGERY

Cramer, C D. Experimental Thrombosis (Experimentelle Thrombose). *Nederl Tijdschr v Verlosk*, 1940, 43: 160.

According to many authors, anaphylactic shock, an allergic reaction, is ameliorated by high doses of Vitamin C. For this reason the authors undertook to determine the significance of Vitamin C in the production of thrombi in anemic rabbits, which animals are known to acquire thrombosis after injury to the wall of the vena cava. The animals were made anemic, laparotomized, and the wall of the vena cava was cauterized. On these spots an intraluminal thrombus was formed which more or less closely resembled an unattached central thrombus. One series of animals received daily injections of redoxon (Vitamin C) from the first day of bleeding to the fifth day following the operation, a second series which received no Vitamin C was used for control.

It was noted that there was a definite reduction in the spread of thrombi in the group receiving

Vitamin C. The author concluded, therefore, that a systematic investigation of the Vitamin C content of the blood of patients who are in danger of thrombosis is necessary before these results may be practically applied to human patients.

(DE SNOO) STANLEY ROBBINS, M D

HOSPITALS, MEDICAL EDUCATION AND HISTORY

Davis, J S. The Story of Plastic Surgery. *Ann Surg*, 1941, 113: 641.

This paper is the author's Presidential Address before the Southern Surgical Association summarizing the evolution of the basic principles on which modern plastic surgery is built.

Plastic surgery is one of the oldest of the medical specialties. It is primarily that branch of general surgery which is formative and constructive. Proficiency in plastic surgery demands the same familiarity with the fundamental medical sciences and the same application of surgical principles as is essential in any type of surgery, with, in addition, a refinement of technique, a sense of geometric proportions, and an artistry not commonly called for in the execution of most surgical therapeutic procedures. It deals with the repair of defects and malformations, either congenital or acquired, with the restoration of function and comfort, and with improvement in appearance and consequent relief of consciousness of deformity. The field is not limited to the face alone but extends from the top of the head to the soles of the feet.

Much of the history of plastic surgery is associated with operations for nasal reconstruction. Such reconstructions are reported in the Edwin Smith Papyrus (1600 B C), but probably the earliest true plastic surgery was done by the Hindus and was carried by students and itinerant surgeons to Arabia and the Mediterranean countries. The Hindu surgeons were trained in anatomy and became very dextrous in operative surgery. Sushruta (800-750 B C), the father of Hindu surgery, described methods of advancing cheek flaps for reconstructing the nose, as well as methods for repairing mutilated lips and ears.

Hippocrates (460-370 B C) and Aristotle (384-322 B C) make no mention of skin shifting but described in *De Re Medica* (A D 30) the operative treatment of deformities of the eyelids, the use of flaps for mutilated ears, noses, and lips, the separation of fingers in syndactylism, and a plastic operation on the penis. No mention is made of congenital clefts of the lip. Many of the procedures were probably derived from Hindu sources but no references are made to them. Galen (A D 131-201) described various procedures similar to those of Celsus, but Celsus was given no credit for his contributions.

The use of an arm-flap to reconstruct the nose was first accomplished by an obscure Sicilian family named Branca and first recorded by the Bishop of Lucerne in 1442. It later became known as the

Tagliacotian or Italian method because Tagliacozzi (1549-1599) who wrote the first systematic treatise on plastic surgery brought it to public attention and popularized it. Tagliacozzi incurred the antagonism of the church and after his death this method became a legend and was considered impossible. Fortunately some of his books were saved from destruction by the church and later editions published.

The Indian method of rhinoplasty by means of a forehead flap was described to European surgeons in 1794 by two medical men of Bombay who had observed it practiced by the Tilemaker caste in India. It was introduced in London by Carpué in 1814 into Germany by von Graefe in 1916 into France by Lisfranc in 1826 and into the United States by Warren in 1834.

The name of Dieffenbach (1792-1847) of Koenigsberg will long be remembered. He was a genius in plastic surgery and his method are in use unchanged today. His writings gave a great stimulus to the subject. In the United States at the same time four surgeons who did pioneer work and had important influence on plastic surgery in this country deserve mention: Mettauer (1787-1875), Pancoast (1805-1882), Warren (1811-1867) and Mitter (1811-1859). It is due to these men that the use of pedicled flap became more common and modification such as the island flap (Gertrude, 1887) were introduced. To Gillies of London belongs the credit for showing the tubed flap and popularizing its use.

There seems to be some doubt whether the attempts actually succeeded in the free transplantation of skin. Successful full thickness grafts were reported

experimentally in 1804 but it wasn't until Reverdin reported his epidermic grafts in 1869 that interest became aroused. Ollier in 1872 and Thiersch in 1886 successfully transplanted large films of skin using the epidermis and part of the dermis. Modern surgeons have modified and perfected methods of utilizing these grafts. The successful use of free full thickness grafts was first reported by Wolfe in 1875.

Methods of transplantation of tissues other than skin have been developed within the last fifty or sixty years. These tissues include bone, fascia, cartilage, tendon, cornea, nerve and even digits. Likewise there have been improvements in methods of treating clefts of the lip and palate, hypospadias, scar contracture, hemangiomas, syndactylism and other deformities interesting to the plastic surgeon.

In the present emergency it seems wise to emphasize the importance in the program of Medical Preparedness of combining the Faciomaxillary Division into a Plastic and Faciomaxillary Division. Should this be done and the division be properly developed and manned it will add enormously to the efficiency of the care of the patient with lesions requiring plastic surgery of the neck, trunk and extremities as well as of the face and jaws. This is essentially the type of organization that was developed in England as early as August, 1940.

In the light of the role played by plastic surgery in the mutilating wounds in war and the accidents of civil life it seems evident that there should be close co-operation between the trained plastic surgeons, the Accident Department and the Surgical Service of every great hospital.

BRAD O. D. CANNON, M.D.

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PRINCIPLES OF SURGICAL PRACTICE

THE MANAGEMENT OF ACUTE PERFORATED APPENDICITIS

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INTRODUCTION

THERE are many controversial matters pertaining to the management of acute perforated appendicitis and while it is not expected that through this Panel Discussion complete agreement may be reached on these matters, the Panel will have been worthwhile and will have served its purpose if out of it come acceptable principles upon which various methods of procedure and management may be established

Many factors contribute to the mortality rate of approximately 18 per cent in acute perforated appendicitis in the United States. Too frequently patients delay seeking medical advice after the onset of the symptoms of acute appendicitis. The use of laxatives plays an important role in the high incidence of perforation of an acutely diseased appendix and accounts for most of the deaths which occur. Coller and Potter have stated that every patient in their series of cases who died had had a purge of one kind or another and it was quite apparent that the purge had played an important part in increasing the severity of the disease. Problems in the diagnosis of acute appendicitis often lead to procrastination in recommending or instituting surgical treatment. In many instances the clinical manifestations of acute appendicitis are atypical and it is in the atypical cases that a high percentage of perfora-

tion occurs. It is worthy of emphasis that the typical clinical manifestations of acute appendicitis are not always observed before perforation occurs. We have all been uncertain on occasions and have hesitated to advise an operation when one or another of the cardinal symptoms of acute appendicitis was lacking or was of minor importance, and have observed a patient through to perforation. We have learned that a significant leucocytosis does not always occur early in acute appendicitis, that fever is not always an early clinical manifestation, that nausea and vomiting are often absent, and that the degree of tenderness may not be convincing. The observations of Reid and others emphasize the need for due consideration of those clinical manifestations and findings resulting from an acute process in a low-lying or pelvis-occupying appendix. One can seldom anticipate with accuracy the process within the appendix by the pre-operative clinical manifestations, nor can one anticipate the turn that an acute inflammatory process in the appendix may take. Many years ago Deaver said, "An early operation by the amateur for non-perforated appendicitis is far preferable to an operation by the master surgeon after perforation has occurred." The mortality rate of appendectomy for non-perforated appendicitis is low and when legitimate clinical evidence of acute appendicitis is manifested the patient's interests are usually best served by early appendectomy. That the appendix upon removal is not always gangrenous and

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at the point of perforation does not alter the soundness of the policy of early operation in acute appendicitis

The incidence of perforation remains high. Some years ago a review of a series of 422 cases of acute appendicitis which I had operated upon revealed that perforation had occurred in 126 cases or 29.8 per cent with various resultant processes ranging from localized dissemination of the infection or local abscess to general peritonitis. The deaths in the cases in which perforation of the appendix had occurred accounted for 80 per cent of the deaths in the entire series of cases of acute appendicitis. There is little reason to believe that in general the incidence of perforation has materially decreased during recent years. It would seem that only through the adoption of certain policies of management may progress be made in reducing the mortality rate of acute perforated appendicitis.

Among the questions that might be asked in this discussion is one which pertains to the immediate operation versus the delayed operation in certain cases of acute perforated appendicitis. There are those who subscribe to immediate operation in practically all cases and are able to support their position by convincing statistical material. There are likewise those who recognize a distinct advantage in the deferred operation in certain instances of acute perforated appendicitis. The conditions and circumstances under which drains may be placed advantageously in the peritoneal cavity or may be withheld have been subjects of considerable controversy during

recent years. There has been little agreement on the type of incision that may usually be employed most advantageously.

Some controversy exists as to the management of acute perforated appendicitis in childhood and this has raised the question as to whether or not acute perforated appendicitis in children differs materially from that in adults. Ladd has said that the child is not a small sized adult; that the appendix in the child is relatively larger than it is in the adult; that the mesentery is relatively longer and less fixed in the child than in the adult; and that the omentum may be shorter and higher in the child than in the adult—all of which may contribute to greater dissemination of infection in the child once perforation has occurred with less tendency for localization to occur. Many are agreed upon the policy of immediate operation in practically all cases of acute perforated appendicitis in childhood. However, Miller *et al* have concluded that a conservative course is indicated when the clinical evidence reveals definite localization of the infection (a palpable mass) and that in only a small percentage of these patients is surgical drainage necessary.

Dr. Willis D. Gatch, who with his associates has recently reported 135 cases of acute perforated appendicitis in children with 4 deaths, a mortality rate of 2.9 per cent. Dr. Lawrence S. Fallis and Dr. Henry K. Ransom will discuss various matters pertaining to the management of patients with acute perforated appendicitis. Following these discussions questions may be asked from the floor.

ACUTE PERFORATED APPENDICITIS IN CHILDHOOD

WILLIS D. GATCH, M.D., F.A.C.S., Indianapolis, Indiana

I BELIEVE in immediate operation for acute appendicitis without too much regard to how ill the patient may seem. We cannot tell before operation whether the appendix is perforated or not or what the extent of the peritonitis is. Many patients with gangrene or suppuration but without perforation are just as ill and apparently have just as much peritonitis as those with perforation. A policy of delay will therefore prevent operation before perforation in many cases. Even at operation the surgeon will be unable to determine the extent of the peritonitis unless he exposes a dangerously large area

of peritoneum. Furthermore, two not uncommon and very dangerous complications of perforation of the appendix cannot be recognized except at operation. I refer (1) to perforation at the ceco-appendiceal junction due to pressure of a fecalith for unless this condition is treated promptly the contents of the cecum are liable to pour into the peritoneal cavity and (2) to rupture of the peritoneal adhesions around a tense abscess which may cause the sudden development of general peritonitis.

We regard the controversy on the relative merits of early and late operation as unfortunate. It has led to a widespread belief that operation on any case of appendicitis can be indefinitely postponed.

poned. Immediate operation does not mean operation without thorough study and preparation of the patient, which may take several hours. The preparation should consist of the administration of normal salt solution by vein if simple dehydration is present, of the relief of gastric distention by means of a Levine tube, and of the administration of morphine and atropine to make anesthesia safe and easy to induce. We believe that the McBurney incision should be used on practically all patients with appendicitis. It permits removal of the appendix with a minimal exposure of intestine. It also permits the insertion of drains without danger of evisceration or much danger of postoperative hernia, and it also permits wound closure without constriction of the tissues. If the appendix is in a high position in the region of the lower pole of the right kidney, it can be quickly removed by extending the separation of the fibers of the external oblique muscle to a point immediately over the appendix, and making a second separation of the fibers of the internal oblique muscle at this place. This procedure gives ample room. In every case of advanced appendicitis in which the appendix is at or over the pelvic brim, the operator should never close the abdomen until he has explored the pelvis for an abscess. Failure to do this will lead, in many cases, to a great accumulation of pus in the true pelvis. We believe that the doctrine of not draining has been carried too far. We do not drain in any case in which there is no perforation, and we do not drain all cases of early perforation in which there has been no great soiling of the peritoneum, but we do drain all cases in which there is a deep infection of the peritoneum and any considerable quantity of necrotic or devitalized tissue. For this purpose we use Penrose tubes without gauze. Four or five of these can be inserted through an opening in the abdominal wound no larger than that required for one cigarette drain. The gauze in the cigarette drain quickly becomes clogged with exudate so that the drain becomes a plug. A pack of Penrose drains, however, permit of constant drainage. It is highly desirable in all cases in which it is possible, to interpose the omentum between the Penrose drains and the intestines and to keep the drains as close to the parietal peritoneum as possible.

We are convinced that widespread peritonitis in cases of advanced appendicitis is not as common as it is generally thought to be. In a series of 119 cases of appendicitis with perforation treated by immediate operation, there was 1 death, and this was from vegetative endocarditis several months after operation. It is certain that

none of these patients had general peritonitis, because, I think everyone will agree, general pyogenic peritonitis, such as may complicate advanced appendicitis, is always fatal no matter what the treatment. The fear of spreading peritonitis by immediate operation for advanced appendicitis is unfounded provided a proper operation is done. As we have already pointed out, immediate operation offers the only hope of preventing the spread of peritonitis when the two most dangerous complications are present.

We wish to say a word about so-called toxemia of peritonitis. There is ample experimental and clinical evidence for the conclusion that the peritoneum has an astounding ability to wall-off infection and to prevent the passage of bacteria and their toxins into the circulation. The symptoms of widespread peritonitis and of widespread cutaneous burns are identical. In both conditions there is a great concentration of the blood which is caused by injury to the capillary endothelium, which permits the escape of blood proteins into the tissue spaces. The symptoms of extreme concentration of the blood are cyanosis, generalized edema, tachycardia, bubbling râles throughout the chest, and euphoria. Bedside observation is sufficient to distinguish this picture from that produced by simple dehydration. With simple dehydration the skin of the patient has a brick-dust tinge, the tongue is dry and the skin loose. We have observed hemoconcentration due to loss of blood proteins in a comparatively small number of our most advanced cases. When it is present the patient should not be given water or salt solution because this makes the condition worse by washing more blood protein out of the injured capillaries. The essential treatment should be the administration of large quantities of blood plasma. Patients with hemoconcentration as the result of widespread peritonitis or of cutaneous burns have sufficient fluid in their bodies, but it is within the tissue spaces and not within the blood vessels where it belongs. The limitations of the treatment of widespread peritonitis are the same as those of the treatment of extensive burns. When a very great area of endothelium has been damaged, blood plasma will escape into the tissue of the injured area as rapidly as it is given. With burns of moderate extent and with peritonitis of not too great extent, administration of blood plasma and the withholding of water may give the body the help it needs to keep the circulation going.

The most common complications we have encountered have been bowel obstruction, subphrenic abscess, and pelvic abscess. We have not

deemed it necessary to use a Miller Abbott tube for the relief of obstruction which may occur with advanced appendicitis. Continuous gastric lavage has been sufficient. Our postoperative treatment is simple: (1) continuous gastric lavage if distention is present; (2) cautious administration of

water if there is evidence of hemoconcentration and in this event the administration of adequate quantities of blood plasma; (3) administration of enough morphine to keep the patient comfortable and (4) constant vigilance to detect complications.

MANAGEMENT OF ACUTE PERFORATED APPENDICITIS

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An intact appendix, regardless of the amount of inflammation or gangrene of its walls, is a purely local condition; the treatment of which lends itself well to direct approach, viz. immediate appendectomy. The ruptured appendix, on the other hand, presents a two-fold problem in management: for in addition to treatment of a diseased appendix, treatment of the complication of peritonitis is necessary. When the contents of the appendix are liberated into the peritoneal cavity, the fate of the patient is determined by many factors, foremost of which is the ability of the natural defenses of the body to combat the infection. Peritonitis is the lethal factor in these cases; thus all treatment should be directed toward aiding the natural defense mechanism of the body and preventing the spread of infection.

It is manifestly illogical to treat a patient suffering from appendicitis and peritonitis in exactly the same manner as a patient with appendicitis alone. Immediate operation therefore has no place in the management of patients admitted to the hospital with a ruptured appendix. Operation is urgently required on all patients except those who obviously cannot withstand surgical intervention but should never be performed without a adequate pre-operative preparation. Failure to appreciate this fact has been responsible for many otherwise avoidable deaths and is directly the cause of the development of the school of thought that advises non-operative treatment of appendiceal peritonitis. It is not so long ago that dehydrated, desperately ill patients were rushed from the emergency into the operating room and operated upon immediately. The wonder is not that so many died but that any of them survived. This mode of treatment was undertaken in the mistaken belief that removal of the appendix was the essential part of the treatment.

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From the Department of Surgery, Henry Ford Hospital, Detroit, Michigan.

In the modern management of perforated appendicitis each case should be considered as a problem. At the Henry Ford Hospital we perform appendectomy upon all but the most seriously ill patients, but not until they have been put in the best possible condition to withstand operation. When the diagnosis is definitely established and the course of treatment decided upon, adequate morphine sedation is administered. Occasionally, in very excitable patients, it is necessary to augment the morphine with barbiturates. The amount of pre-operative treatment we give our patients depends on their condition on admission. If the patient is only moderately ill, treatment consisting of the intravenous injection of 500 c.c.m. of 5 per cent glucose solution is given in the emergency room and operation is deferred for only an hour or so. If there has been recent vomiting, the stomach is lavaged with the duodenal tube inserted through the nose and left in place. These simple measures will usually suffice to prepare the patient for operation. If, however, the patient presents evidence of profound toxicity, such as marked dehydration, a rapid thready pulse, lowered blood pressure, he is admitted to a regular hospital room and every effort is made to improve his general condition before submitting him to operation. Fluid balances are restored by intravenous administration of 500 c.c.m. of 5 per cent glucose solution and subcutaneous injection of from 1,000 to 1,500 c.c.m. of normal saline solution. Lowered blood pressure is raised by whole blood or plasma transfusion as indicated by the patient's condition. Repeated vomiting of ileus is controlled by Wangenstein suction drainage and if operation is to be deferred, repeated hours continuous hot stupes are applied to the abdomen.

Under this regime all but the most seriously ill patient will show improvement in a few hours as indicated by a lowered pulse rate and an improved blood pressure reading. Operation may now be undertaken with much less hazard.

Anesthesia Spinal anesthesia is used if feasible that is, if the condition of the patient's myocardium warrants. Patients to whom spinal anesthesia can be administered safely are those possessed of cardiac reserve sufficient to restore the systolic blood pressure after the initial drop which so often occurs. Patients who are poor risks are definitely not suitable for spinal anesthesia. Open drop ether is probably the safest anesthetic agent. However, ethylene or cyclopropane, with or without the addition of ether, supplemented by local anesthesia give good results. Local anesthesia alone is of value only for drainage of localized abscesses when no attempt is being made to remove the appendix.

Incision The McBurney incision is our choice, because it is the least disturbing to the patient. Adequate exposure is obtained in difficult cases by the Weir extension. Localized collections of pus can be drained without having the drains traverse the general peritoneal cavity, and through this incision drains can be placed in both the pelvis and the right colonic gutter. Finally, when the operation is over the wound can be left open or loosely closed without danger of evisceration and with only a minimal possibility of subsequent herniation. No other incision offers all these advantages.

The Operation Gentleness in handling tissues should be the keynote of the operation. This means avoidance of strong retraction, the use of suction instead of sponging for the removal of purulent collections, and the minimal use of gauze for walling off. Prolonged operations should be avoided. If the appendix is not readily accessible, and your experience is limited, be content to drain only. If the base of the cecum is friable, do not attempt to invert the stump of the appendix, for ligation alone is quite satisfactory. Drainage is practically always necessary. Soft rubber drains are the only type that should be employed. In localized peritonitis drainage to the abscess site is sufficient, but in diffuse peritonitis the pelvic cavity and Morrison's kidney pouch should also be drained. The layers of the abdominal wall should be closed very loosely around the drains and in severe infections the skin and subcutaneous tissues should not be sutured. Moderately ill patients will withstand the operation better if 600 c cm of 5 per cent glucose and saline solution are given intravenously during the course of the operation, and very sick patients can be safely carried through if supported by whole blood or plasma.

Postoperative Care Regardless of the extent of the peritonitis found at operation all cases should

be treated as cases of general peritonitis because operation may convert a localized into a spreading peritonitis. Fowler's position of the patient promotes the collection of purulent products in the pelvis, where, even if they are not less harmful than in the upper abdomen, they are at least more accessible. Ileus, the most dreaded complication of peritonitis, is best controlled and combated by withholding all fluids or foods by mouth. The stomach and duodenum are kept dry by continuous suction through a nasal duodenal tube. Water in small amounts by mouth is most gratifying to the patient and can do no harm, for it is quickly removed if adequate suction is maintained. Intestinal tone is maintained by the application of hot stupes and by $\frac{1}{4}$ gram of morphine every four hours as tolerated. A rectal tube will allow the escape of flatus. Enemas and direct stimulation of the intestinal tract by pitressin or prostigmin are best withheld until there is evidence of clinical improvement. Water balance is maintained by the subcutaneous administration of normal saline solution and the intravenous administration of 5 per cent glucose solution. Approximately 5,000 c cm of water are required daily by these patients. A good working rule is to give enough fluid to maintain a urinary output of at least 1,000 c cm. If there is much gastric or duodenal drainage, the amount of fluid given must be increased by an amount corresponding to the extra drainage. Daily blood-chloride estimations must be carried out. Replacement of chloride deficiency is made by giving hypertonic saline solution intravenously. The best method of attacking the infection itself is by daily transfusion of whole blood or plasma. Repeated estimations of serum globulin and serum protein will determine the amount of plasma necessary to restore protein loss. Sulfanilamide administered subcutaneously in an 0.8 per cent solution also appears to be of value in controlling the infection. Extremely toxic patients or those exhibiting evidence of cyanosis are helped by the oxygen tent. Restless, nervous, and apprehensive patients require barbiturates in addition to morphine. Sodium phenobarbital (2 to 4 gr) given intravenously is of definite value.

During convalescence a maintained rise in temperature usually indicates a localized collection of inflammatory products. The commonest site is the pelvis. Fortunately most of these phlegmons absorb but occasionally they go on to abscess formation. Unless careful and repeated rectal examinations are made the diagnosis is often missed. Pelvic abscesses may point in the suprapubic region or along the left colonic gutter,

where they may be drained easily under local anesthesia. The development of diarrhea and the passage of mucus usually indicates their presence. Drainage may occur spontaneously through the rectum or may be deliberately performed by the surgeon.

INTERNATIONAL ABSTRACT OF SURGERY

Subphrenic collections occasionally appear and these too often absorb. The detection of a subphrenic abscess and the decision as to the necessity for operative intervention are clinical problems which tax the judgment of even the most experienced.

THE MANAGEMENT OF PERITONITIS DUE TO THE PERFORATED APPENDIX

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THIS discussion is concerned with the more general aspects of the management of peritonitis of appendiceal origin. Whether or not operative intervention is indicated at once the patient with general peritonitis requires the most careful supportive treatment in order to enable him to combat his infection and to carry him through the period of severe toxemia.

Alterations in Body Chemistry. The patient with general peritonitis manifests important alterations in his body chemistry and these deviations from normal must be recognized and corrected. Because he has been unable to eat or drink during the period of his illness and also since he has lost a considerable quantity of fluid by vomiting he is usually severely dehydrated. Sodium and chloride ions are lost through vomiting and aspiration of the upper gastrointestinal tract. Alkalosis is often present. Less commonly in peritonitis will sufficient fluid be lost from the lower intestinal tract to result in a high sodium loss with a resultant morganic acidosis. Because of exhaustion of the glycogen stores due to fever and starvation the ketosis consequent upon the incomplete combustion of fats is often observed. Of equal importance is the state of hypoproteinemia which is frequently found.

Restoration of Fluid Balance. The loss of body fluid from vomiting aspiration exudation into the peritoneal cavity and occasionally from diarrhea produces a state of severe dehydration. Clinically this is manifested by the sunken eyes, the dry inelastic skin and the parched tongue. The urinary output is low and complete anuria may supervene. It has been shown (Coller and Maddock) that patients who exhibit this clinical picture have lost 6 per cent of their body weight in fluid. This amount must first be administered.

In order to overcome the dehydration and to restore a state of normal fluid balance. Thereafter water balance must be maintained. This is easily accomplished according to the following plan: (1) 2000 c cm of fluid will be required each twenty four hours to replace that lost through the skin and lungs (2) since a daily urinary output of 1500 c cm (specific gravity of 1.015) is desirable this additional amount (1500 c cm) must be given (3) furthermore an amount equivalent to the daily losses through vomitus and diarrhea and from fistulas or uction drainage must be included. Thus the total amount of fluid required for each twenty four hour period will be 3500 c cm plus an amount equal to all abnormal losses. If the urinary output is adequate in amount the patient is usually in a state of water balance.

Restoration of Chemical Balance. Because of the fact that fluids lost by way of the gastrointestinal tract contain electrolytes important in the body economy hypochloremia is to be feared. Frequent determinations of the plasma chloride values are therefore essential.

If a depletion of the blood chlorides is found this condition along with the concomitant dehydration may be corrected by the administration of normal saline or Ringer's solution until the plasma chlorides have been elevated to normal. Thereafter normal saline or Ringer's solution is given only in an amount equivalent to the total quantity of fluid lost from the gastro-intestinal tract during the preceding twenty four hours. In the event that there have been no abnormal losses from the digestive tract 500 c cm of normal saline or Ringer's solution daily will suffice. Sodium chloride in excess of the actual needs of the body is to be avoided since a surplus amount may be responsible for retention of water in the tissues and occasionally by the same mechanism result in a dangerous pulmonary edema. The remainder of the calculated fluid requirements

should be given in the form of 5 to 10 per cent glucose solution. This amount of glucose will be sufficient soon to overcome the ketosis. As a rule a 5 per cent glucose solution is best since it is isotonic and when given intravenously causes less damage to the veins. All fluids are given preferably by venoclysis and at a rate of from 300 to 500 c cm per hour. When serum-protein determinations give evidence of hypoproteinemia, blood or plasma transfusion is indicated.

Physiological Rest for the Gastro-Intestinal Tract
Abdominal distention along with reverse peristalsis and the stasis of the upper intestinal tract so commonly associated with distention presents a serious problem in the management of general peritonitis. These conditions are most often due to an adynamic ileus, although in some instances actual mechanical obstruction may be present. Extreme distention of the bowel is harmful since it results in an elevation of the diaphragm with consequent respiratory embarrassment. In addition, over-distention of the bowel interferes with its blood supply, sometimes to such an extent that gangrene and perforation may follow.

The distention due to adynamic ileus or the early adhesive mechanical obstructions are most satisfactorily combated by means of duodenal or intestinal aspiration. Duodenal suction is usually carried out by means of a Levine or Jutte tube and the method of Wangenstein. In some cases the "long" or Miller-Abbott tube is more efficacious especially in decompression of the lower reaches of the small intestine.

Morphine is probably the most useful drug used in the treatment of peritonitis. It should be used liberally, usually in doses of $\frac{1}{4}$ gr every four hours unless there is marked slowing of the respiratory rate. The drug is of value since it relieves pain and discomfort and keeps the patient drowsy and contented. Thus the discomfort of the venoclysis needles and the indwelling nasal tube is minimized. Of equal importance is the fact demonstrated by Orr that morphine increases the tone of the intestinal wall and promotes rhythmic contractions.

It is needless to state that purgatives for the relief of abdominal distention are contraindicated, and much the same may be said regarding enemas. The latter are exhausting to a very ill patient, and they only temporarily empty a small segment of bowel. In addition, they frequently provoke reverse peristalsis, which in turn aggravates the distention. A rectal tube used periodically for a short time may afford some relief.

For the most part, drugs such as esserine or those of pituitary origin, often recommended be-

cause of their supposed beneficial effects on intestinal distention, are of questionable value. If active peristalsis is stimulated, the result may be a spread of infection. In certain cases prostigmine seems to be of value.

With regard to the question of whether to apply heat or cold to the abdomen, we much prefer the use of heat. Heat may be applied by means of stupes or massive hot dressings or probably best by an electric-light heat tent, or bake. Local applications of heat are more comfortable for most patients than cold. Because of the vasodilatation of the vessels of the abdominal wall, the incidence of thrombophlebitis in the lower extremities is decreased, and this same vasodilatation tends to reduce the amount of blood in the splanchnic area, which in turn has a favorable effect upon distention. The ice-bag, on the contrary, may mask symptoms through its anesthetic effect. Moreover, because of the local ischemia of the abdominal wall which it produces, a severe wound infection may ensue should a surgical incision subsequently become necessary.

The patient should be placed in the Fowler position largely because it is the position which affords the most comfort. Breathing is made easier since it minimizes the respiratory embarrassment consequent upon a high diaphragm. The muscles of the abdominal wall are relaxed and this in turn lessens abdominal discomfort. Whether or not this position assists materially in the localization in the pelvis of purulent exudates is problematical.

Other Measures
Oxygen therapy is an important adjunct in treatment. In general peritonitis cyanosis is common and while it may be due only to simple mechanical interference with respiration, it often indicates a more serious complication such as a failing circulation or pneumonia. In most cases of peritonitis, oxygen is therefore indicated. Another benefit to be obtained from oxygen has been demonstrated by Fine, who showed that intestinal distention may be overcome by the administration of high concentrations of oxygen. Oxygen may be administered by means of an oxygen tent or, more simply, through a nasal tube, according to the method recommended by Waters. If 100 per cent oxygen is to be used it is best given by means of the Boothby mask.

Following the introduction of sulfanilamide into the field of medicine and surgery, the effect of this drug in appendiceal peritonitis has recently been studied by Ravidin, Rhoades, and Lockwood. While the peritonitis of intestinal origin is due to infection by a number of different organisms,

these authors believe that the bacteria involved are relatively but not entirely resistant to sulfanilamide bacteriostasis. As the result of considerable experience they have reported good results from the use of this drug in cases of spreading peritonitis due to acute appendicitis and in cases of acute appendicitis in which peritonitis was feared. It has more recently been shown that sulfanilamide powder may be safely placed directly into the peritoneal cavity at the time of operation. That it is rapidly absorbed from the peritoneal surfaces is shown by the fact that a fairly high blood level is obtained in a few hours.

Patients with an extensive peritonitis obviously have a severe toxemia. In such cases at autopsy adrenocortical degeneration has been noted.

Since extracts of adrenal cortex are now available they deserve a trial both as substitution therapy and as an aid in maintaining electrolyte balance.

Blood transfusions are of inestimable value. They aid in combating the anemia which may develop during the course of the severe infection and also serve to maintain the plasma proteins at a proper level. Hypoproteinemia often occurs as the result of the greatly reduced protein intake and more importantly from the loss of large amounts of protein from the circulation due to the exudation of fluid into the peritoneal cavity. It is especially important when sulfanilamide is being used to have daily counts of both the red and white blood cells. A fall in the number of either calls for transfusion.

QUESTIONS AND ANSWERS

Question Why do you not favor conservative treatment?

DR FALLIS I believe that if one was certain one was dealing with the purely inflammatory type of appendicitis conservative treatment would yield excellent results but because there is no method short of operation of being certain that the case in question is of the inflammatory type I believe in operation when the patient can be put in the best possible condition provided there is a reasonable chance that the operative intervention can be done safely. I realize that there is such a thing as meddling surgery and that improper and inopportune operations have cost patients their lives but at the same time there is no reason for sacrifice a sound surgical procedure because it is incorrectly practiced by a few.

Another reason for this stand is the difficulty of actually knowing if the appendix has ruptured. All surgeons of experience have made a pre-operative diagnosis of ruptured appendix but when the abdomen was opened they have found an entirely gangrenous but unruptured appendix the removal of which was accomplished without drainage and with only a short hospital stay. What would have been the fate of such a patient under conservative treatment? At best a long period of hospitalization. Proximity of the inflamed appendix to the peritoneum of the anterior abdominal wall will give clinical signs of diffuse peritonitis.

Another reason for discrediting the conservative treatment of appendicitis with peritonitis is the impression created among general practitioners that there is no urgency about appendicitis especially if they see the patient after twenty four or forty eight hours from the onset. The pro-

ponents of conservative treatment of course do not mean this at all but the idea has gained ground among the profession and is I am certain responsible for some of the increased mortality.

Question In a reasonably typical case of acute appendicitis if you believed that rupture had recently occurred would you operate at once or would you delay operation?

DR RANSOM If perforation has occurred within the past four or six hours the regional peritoneum is still in the stage of contamination or possibly early infection. Since the peritoneum ordinarily is able to resist infection surprisingly well this amount of involvement will be handled by the body if the source of the contamination is removed. Assuming that the general condition of the patient is satisfactory prompt operation would be the procedure of choice.

Question Do you think there is any place for conservative treatment?

DR FALLIS Yes—for extremely ill patients whose condition does not improve under a pre-operative regimen. Operation cannot be expected to help these patients in any way. The only hope lies in conservative management.

Question When would you employ the Ochsner regimen (delayed operation) for ruptured appendix?

DR RANSOM In our opinion the Ochsner plan of delayed operation is indicated in unmistakable cases of widespread or spreading peritonitis. In such circumstances the patient is usually critically ill and in the course of a few hours or days his condition may be much improved by the various supportive measures. He should be carefully watched and localized abscesses drained as they appear. We insist that one should not use the term delayed operation for appendicitis or

"non-operative treatment of appendicitis" to denote the Ochsner regimen. The latter is a plan of treatment for peritonitis which, of course, may be and very commonly is a complication of appendicitis.

DR GATCH Operation, for reasons I have already given, is the only means of preventing widespread peritonitis in the patients most likely to have it. There is no proof that a proper operation, on a patient prepared for it, spreads peritonitis. Our own results have been much better with immediate than with delayed operation.

Question If operative intervention is delayed and regardless of whether or not residual abscesses develop which may require drainage, what should be done about the appendix?

DR RANSOM The appendix which has once perforated due to an acute infection is prone to do so again. The patient should therefore be urged to have it removed by interval operation within a reasonable period after the subsidence of the general peritonitis. As a rule patients are instructed to return for interval appendectomy in two or three months following discharge from the hospital.

Question If a patient presents himself with a history of an illness of one week's duration, exhibits moderate fever and leucocytosis, and is found to have a palpable mass in the right lower quadrant, how should he be treated?

DR RANSOM In such cases, such a tumor mass often represents not an abscess, but rather an area of inflammatory infiltration of the omentum, peritoneum, and adjacent structures, possibly with small miliary abscesses. Since the latter cannot be satisfactorily drained by any surgical operation, conservative treatment is best. Usually such masses will rapidly subside, and interval appendectomy may be performed at a later date. If, on the other hand, clear evidence of suppuration appears, surgical drainage (usually without appendectomy at this time) is indicated.

Question When should an appendicitis abscess be operated upon?

DR FALLIS An operation for abscess is never an emergency operation. The patient should be prepared for operation over a period of at least twenty-four hours and longer if necessary. It is true that many abscesses will entirely absorb, so that appendectomy may be performed later as an interval operation. At the same time the patient with an unresolved appendix abscess has a form of infection which, at any time, may metastasize to some other part of the body. Pylephlebitis or brain abscess, though not common complications, are not unknown. It, there-

fore, appears to be sound surgery to evacuate appendiceal abscesses when the patient is put in good condition.

Question Should the appendix always be removed?

DR FALLIS We believe that the appendix should be removed provided it is accessible and removal can be accomplished in a reasonably short time with a minimum of trauma. This means, of course, that the removal of a difficult appendix should be undertaken only by a surgeon of experience. The more training the surgeon has had the more safely he can remove the inaccessible appendix. Beginners and occasional surgeons should be content with drainage only. Removal of the appendix at the time of operation removes the septic focus, shortens the period of convalescence, and avoids a second operation. There are occasions, however, such as in the very young, the very old, and the very sick, when even the most experienced surgeon must abandon the idea of appendectomy and depend entirely upon drainage.

DR GATCH I wish to add to what Dr Fallis has said that the removal of the appendix subsequent to the drainage of an abscess, may be a difficult and dangerous operation.

Question What about drainage?

DR FALLIS It is our practice to drain all cases of ruptured appendix. Drainage to be effective should be adequate. It is manifestly impossible to drain the whole peritoneal cavity, but it is possible to drain areas where collections of pus are most likely to occur. These areas are the pelvis, the kidney pouch of Morrison, and the region of the appendix itself. In localized abscesses in the region of the appendix, drainage of this area alone is sufficient, but when there is a diffuse peritonitis it is necessary to drain also the kidney pouch and the pelvic cavity. The kidney pouch is readily drained through a McBurney incision by the insertion of a drain upward along the right colonic gutter to the under surface of the liver. If any other incision is used it is better to make a stab wound in the flank. Failure to drain this region may result in the development of a subphrenic abscess. The pelvis can also be drained through a McBurney incision, but it is important to be certain that the distal end of the drain is at the bottom of the pelvic cavity. If the pelvic cavity is full of pus the tendency is for overflow upward along the left colonic gutter. Thus, in diffuse peritonitis it may be necessary to make a suprapubic or even a left lower quadrant stab wound in order to provide free outlet for the purulent collection.

Penrose drains alone are permissible. Their removal should be accomplished slowly and should not be begun until it is evident that the patient's progress is favorable for early removal of pelvic drains is very often found to be responsible for the development of secondary pelvic abscesses.

Question How do you deal with the appendix stump?

DR FALLIS If the base of the cecum is indurated no attempt should be made to invert the stump of the appendix. Simple crushing and ligation is satisfactory. When there is no induration I favor inversion of the appendix stump by means of a purse string suture of fine silk on an atraumatic needle. I have never seen an abscess form in the cecal wall as the result of inversion. The secret I believe lies in the use of atraumatic needles. Large needles with a double strand of catgut are very likely to pick up the mucosa of the cecum and in this way give rise to abscesses in the wall.

Question When sulfanilamide is used in the treatment of appendiceal peritonitis what doses should be employed and how long should the drug be continued?

DR RANSOM During the first twenty-four hours from 6 to 8 gm. of the drug are given. A convenient plan is to reduce the dose 1 gm. each day. It is desirable to establish a blood level of from 8 to 10 mgm. per cent as rapidly as possible. This level may then be allowed gradually to decline. If it is deemed best to continue the sulfanilamide therapy for a longer time the dosage may be maintained at about 3 gm. per day for ten days or more after this level is reached. In general the duration of the administration of the drug depends upon the degree of improvement and upon the general condition of the patient. As a rule the medication should be continued until definite clinical improvement is noted. Hematuria and jaundice of course may contraindicate its prolonged use.

Question If sulfanilamide powder is placed directly in the peritoneal cavity how much should be used?

DR RANSOM In the use of sulfanilamide intraperitoneally the usual dose is 5 gm. of the powder. Occasionally however larger doses even reaching as high as 10 gm. have been used without untoward effects. Experimentally it has been shown in dogs that relatively large doses resulting in blood levels of 35 mgm. per cent have not

been harmful and when the animals were sacrificed at a later date no evidence of local tissue damage could be found.

At the conclusion of the discussion a majority opinion of the Fellows on the floor indicated the following:

- 1 That most cases of acute perforated appendicitis should be operated upon immediately.
- 2 That there is a distinct place for the deferred operation in certain cases of acute perforated appendicitis which confirms an old adage that under certain circumstances it is too late for an early operation and too early for a late operation.
- 3 That the McBurney incision is usually preferable to any other.
- 4 That adequate drainage should usually be provided when gross intraperitoneal infection is present.
- 5 That sulfanilamide therapy including intraperitoneal installation of the powder is entirely in order.

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ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

HEAD

Stevens, J B Osteomyelitis of the Frontal Bone, Report of 3 Classified Cases *Arch Otolaryngol*, 1941, 33 694

Stevens states that the management of osteomyelitis of the frontal bone is dependent on Drainage and the establishment of the classification

Careful removal of all the infected bone

Symptomatic treatment, including the intravenous administration of dextrose solution, blood transfusion, and the administration of sulfanilamide or one of its less toxic derivatives

If the infection is due to a streptococcus of the hemolytic variety, human scarlet-fever convalescent serum is of apparent value

If the infection is due to one of the types of pneumococci, the corresponding type of pneumococcic serum should be used, with the possible addition of sulfapyridine JAMES C BRASWELL, M D

EYE

Chinn, H, and Bellows, J G The History of the Crystalline Lens *Quart Bull Northwestern Univ Med School*, 1941, 15 174

An attempt is made to trace the development of ophthalmological knowledge from the early Egyptian and Hindu civilization to the beginning of the twentieth century Susruta, an Indian savant living during the Epic period (2500 to 600 B C), was the foremost ophthalmologist of this era Remarkable advances in general surgery as well as in ophthalmology have been attributed to him He gave elaborate descriptions of the anatomy, pathology, and therapeutics of the eye, including detailed directions for surgical procedures in some 40 to 50 ocular conditions He practiced extensively the couching operation for cataract This consists in depressing the opaque lens below the pupillary area a procedure still extensively employed by itinerant practitioners in the Orient

Relatively little of the lens was discovered by the ophthalmologists of the Grecian, Alexandrian, Roman, or Byzantine periods The lens was still thought to be the recording device of the eye, and cataract nothing but a diseased humor that descended from the brain to produce a mechanical obstruction to normal vision The term cataract ("flowing down") was derived from this concept The treatment for cataract was the tearing away of this membrane, to allow light to reach the lens Actually, of course, the lens itself was dislodged, which allowed the light to reach the retina

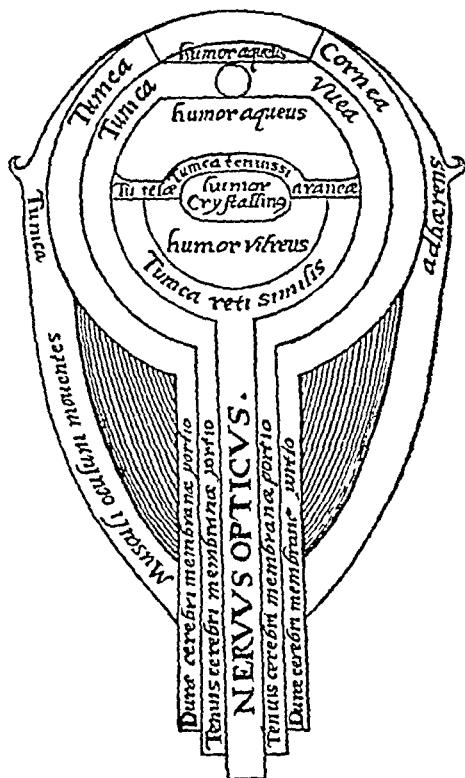


Fig 1 The anatomy of the eye (From the Thesaurus of Alhazen Bale, 1572 A D)

The Arabic, or Saracenic, Middle Ages saw great advances in operative technique and theoretical optics Little was discovered of the anatomy of the eye because of the prohibition of dissection by the Mohammedan religion Chief among the workers were Ali ibn Isa, al Razi, Ammar ibn Ali, Albucases, Avicenna, and Alhazen Ali ibn Isa is considered by many as the most important ophthalmic writer prior to the eighteenth century His ophthalmological book was the standard text for centuries and is even today in use by the Arabs

The Crusades were the cause of the widespread dissemination of knowledge of the Islamic civilization through Western Europe The brilliant optical discoveries of da Vinci, Porta, Maurolycus, Father Scheiner, and Kepler resulted in the visualization of the eye as a camera obscura with the retina as a screen and the lens and cornea serving as refractive

media In 1656 Werner Rolfsack dissected a cat aractous eye from a cadaver and found the lens to be opaque This was the first p cific indication that cataract was an alteration in the transparency of the lens itself and not an inspissated humor in front of that organ The first removal of the cataractous lens from behind the pupil through an incision in the cornea was performed by Daniel in 1747 This was one of the greatest advances in the history of ophthalmology

With the discovery by Helmholtz of the ophthalmoscope in 1851 the examination of the living eye was tremendously enhanced The introduction of the slit lamp by Gullstrand in 1911 then enabled the studies of the intact eye under magnifications corresponding to those of histological sections

The development of theories of accommodation is outlined

EAR

Young N Bleeding from the Ear as a Sign of Leaking Aneurysm of the Extracranial Portion of the Internal Carotid Artery J L yng & Otol 194 36 35

Two cases of voluminous bleeding from the ear are reported In one certainly and in the other probably the blood escaped in the first place through the wall of the cervical portion of the internal carotid artery into the parapharyngeal space and then tracked along a well authenticated anatomical highway into the parotid space and so through the wall of the auditory meatus to the exterior

A search of the literature has disclosed reports of 26 similar cases and has suggested that profuse unheralded hemorrhage is more frequently due to erosion of the extracranial than of the intracranial portion of the internal carotid artery It is noted that these hemorrhages from the ear occur only in cases of erosive aneurysm and almost always in children The author discusses the causes results and symptomatic legions of erosive aneurysm in this situation

Young believes that when there is profuse bleeding from the ear with an ipsilateral swelling in the pharynx the indications are that there is a leaking aneurysm of the carotid artery with necrosis of the contiguous hematoma—a progressive condition—and that active treatment must be instituted The most urgent consideration is the arrest of the hemorrhages and this seems little doubt that although the risks of carotid ligation in an exsanguinated patient even though very young are great they have to be run If any form of gradual occlusion is practicable it should be carried out to lessen these dangers but it must be seldom that this is true Ligation of the internal carotid artery is the most effective means of preventing the bleeding and is therefore the operation of choice although it carries with it the greater liability to hemiplegia

The next most important matter is to inhibit the activity of the inflammation and this calls for drainage

age of the infected area However modifications to suit the special circumstances are required so that the weakened wall of the artery may not be left unsupported Indeed everything must aim at a final result which leaves the vessel surrounded by firm fiber and muscle tissues i e a false aneurysm with strong wall Therefore the suggestion is given that all efforts be made to conserve the pharyngeal wall as well as the tissue between it and the carotid sheath while moderately free drainage to the surface of the neck perhaps with counter drainage through the ear is provided No instrument should puncture the pharynx unless an external operation on the neck has failed to reduce the swellings inside of the throat and occlusion of the artery makes it essential to save life

After these adjuvant items of treatment can be considered such as the sedative immobilization of the neck by means of sandbags or the side of the head easily swallowed food silfamidates and blood transfusion NOAH D FABRICANT M D

Slambaugh G E J Inflammation of the Jaw Joint in Acute Suppurative Otitis Media A J Otolaryngol 1941 33 975

In view of the close proximity of the mandibular fossa to the middle ear it is remarkable that extension of infection from the middle ear to the jaw joint does not occur more often Three cases of involvement of the jaw joint secondary to acute suppurative otitis media are added to the literature which previously contained but a reference to the subject

In diagnosing involvement of the jaw joint secondary to acute otitis media it is necessary to differentiate this condition from furunculosis of the external canal and from myofasciitis mastoiditis with external perforation There are eight diagnostic criteria for suppurative involvement of the jaw joint which are of value (1) swelling over the jaw joint with upward displacement of the auricle (2) localization of the point of greatest tenderness over the jaw joint (3) displacement of the jaw downward to the affected side so that the bite fails to close on this side (4) while the lower teeth are displaced toward the opposite side (5) pain on chewing and limitation of the motion of the jaw (6) in the jaw joint caused by pressure on the tip of the chin (7) roentgen evidence of the widening of the mandibular joint space (8) fever and leukocytosis and (9) pus obtained on diagnostic aspiration of the mandibular fossa

If conservative measures such as convalescent serum and chemotherapy do not result in a recession of the symptoms surgical drainage should be instituted to prevent further extension through the joint capsule into the joint itself while necrosis of the cartilage would probably be followed by ankylosis of the joint Drainage of an abscess of the mandibular fossa must aim to avoid injury to the capsule or joint cartilages as well as injury to the superficial temporary artery to the parotid gland or possibly to the upper branches of the facial nerve

NOAH D FABRICANT M D

Williams, H L, Brown, A E, Herrell, W E, and Ralph, R D Sulfonamide Therapy for Acute Otitis Media and Mastoiditis *Ann Otol, Rhinol & Laryngol*, 1941, 50 336

The authors' series consisted of 265 patients who had acute otitis media. Of these, 112 received sulfonamide therapy. For the purpose of analysis the authors included in this group all patients suffering from otitis media who received sulfonamide therapy, regardless of the adequacy of the dosage. The reason for this was the fact that they did not believe it justifiable to build the results of their study entirely on the consideration of adequacy of treatment. There remained, then, 153 patients who did not receive chemotherapy. These patients therefore constituted a control series.

Of the 112 patients who received chemotherapy, 60 had an infection caused by the hemolytic streptococcus, and 16 had an infection caused by the diplococcus pneumoniae. In 36 cases either no culture was obtained or no organism was identified, that is to say, infection was caused by a group of non-specific organisms.

Among the 60 patients who had otitis media caused by the hemolytic streptococcus and who received chemotherapy, the ears of 26 drained for twenty-one days or more. The ears of the remaining 34 patients drained for less than twenty-one days. Among the 16 patients whose infections were caused by the diplococcus pneumoniae, the ears of 3 drained for twenty-one days or more, and the ears of 13 drained for less than twenty-one days. Among the 36 patients whose infections were caused by non-specific organisms, the ears of 10 drained for twenty-one days or more, and the ears of 26 drained for less than twenty-one days.

In the entire series of 112 patients who were treated with sulfonamide drugs, therefore, it is seen that the ears of 39 (35 per cent) drained for twenty-one days or longer, and that the ears of 73 patients (65 per cent) drained for less than twenty-one days.

Among the 153 patients who did not receive chemotherapy, there were 34 (22 per cent) from whom the hemolytic streptococcus was isolated, 15 patients (10 per cent) from whom the diplococcus pneumoniae was isolated, and 104 patients (68 per cent) from whom the culture was negative or from whom no culture was made, that is to say, they had infections caused by non-specific organisms.

The ears of 19 untreated patients (56 per cent) from whom the hemolytic streptococcus was isolated drained for twenty-one days or more. The ears of the remaining 15 untreated patients (44 per cent) from whom the hemolytic streptococcus was isolated drained for less than twenty-one days.

The ears of 6 (40 per cent) of the 15 untreated patients from whom the diplococcus pneumoniae was isolated drained for twenty-one days or more, and the ears of the remaining 9 patients (60 per cent) drained for less than twenty-one days.

Among the 104 untreated patients whose infection was caused by organisms of a non-specific

group, the ears of 22 (21 per cent) drained for twenty-one days or more, and the ears of 82 patients (79 per cent) drained for less than twenty-one days.

In the entire series of 153 patients who did not receive chemotherapy, therefore, it is seen that the ears of 47 patients (31 per cent) drained for twenty-one days or more and that the ears of 106 patients (69 per cent) drained for less than twenty-one days.

In any comparison of the results obtained for the group receiving chemotherapy with the results obtained for the group not receiving chemotherapy, it should be remembered that these statistics may be influenced by the fact that patients who had milder otitis media tended to be included in the untreated group.

Among the 112 patients who received chemotherapy for otitis media, there were 60 whose infection was found to have been caused by the hemolytic streptococcus. Twenty-seven (45 per cent) of these 60 patients had "surgical" mastoiditis as a sequel to otitis media.

Among the 153 patients who did not receive chemotherapy, 34 were found to have otitis media caused by the hemolytic streptococcus. "Surgical" mastoiditis developed in 20 (59 per cent) of these 34 patients. This percentile difference of 14 (59 per cent compared to 45 per cent) in favor of the treated patients, among those patients whose infections were caused by the hemolytic streptococcus, indicates that a moderate protection is offered the patient against the possible development of "surgical" mastoiditis by the administration of sulfonamide drugs.

Among the 16 patients who received sulfonamide therapy and whose otitis media was caused by the diplococcus pneumoniae, "surgical" mastoiditis developed in 3 (19 per cent). Among the 15 patients whose otitis media was caused by the diplococcus pneumoniae and who did not receive chemotherapy, "surgical" mastoiditis developed in 6 (40 per cent).

Among the 36 patients from whom no organism was isolated and who received chemotherapy, "surgical" mastoiditis developed in 8 (22.2 per cent). Among the 104 patients from whom no organism was isolated and who did not receive chemotherapy, "surgical" mastoiditis developed in 13 (12.5 per cent).

At the present time sulfanilamide is the drug of choice in infections caused by hemolytic streptococci. At the time this survey was made sulfapyridine was the drug of choice in infections produced by pneumococci and staphylococci, but it now appears that sulfathiazole may offer some advantages over sulfapyridine in the treatment of these two infections.

It is obvious that no set rules for the administration of drugs will apply to the treatment of all patients who have varying degrees of infection, but, in general, an initial dose of 30 gr (2 gm) of the drug may be administered to adult persons, followed by 15 gr (1 gm) administered every four hours. In the presence of more severe infection it might be well to administer an initial dose of 60 gr (4 gm) of the

drug instead of 30 gr (2 gm). For small children the daily dose usually can be calculated on the basis of 1 to 1½ gr (0.065 to 0.1 gm) per pound of body weight and a half of this total daily dose may be administered as an initial dose.

It is important to emphasize the fact that it is advisable in all types of infection similar to those under consideration herein to prevent exacerbations to continue administration of the drug daily in some such dosage as one half of the therapeutic dose for as long as ten days after the temperature has returned to normal.

Although on the basis of theoretic considerations there would seem to be little reason to expect sulfonamide therapy to exert a favorable effect on acute otitis media or mastoiditis after the first two to four days of the disease a slightly more favorable result

was obtained by the authors in patients who received sulfonamide therapy than in patients not so treated. That such improvement is more apparent than real is suggested by the fact that "urinary mastoiditis developed with nearly equal frequency in the patients receiving so-called adequate dosage and in the patients who received sulfonamide therapy without regard to adequacy of dosage. This observation is based on an analysis of the cases in which hemolytic streptococci were the causative organisms. However, in the group of patients in whom the disease was produced by pneumococci the administration of sulfonamide drugs produced an unquestionable advantage. These results are probably referable to the fact that most of the patients in whom the disease was produced by both pneumococci and streptococci were receiving adequate doses although values for the amount of sulfanilamide present in the blood were not obtained concerning all of these patients."

If therapy with sulfonamide drugs in the presence of acute otitis media or mastoiditis when the disease is caused by streptococci is contemplated the fact should be considered that in the experience of the authors at least administration of the drug had to be discontinued in more than 10 per cent of the patients who received adequate dosage because it produced toxic effects. Furthermore it appears that in patients receiving sulfonamide therapy little or no biologic resistance to the infection develops thus on discontinuance of the therapy if surgical intervention on seems necessary several days should be allowed to elapse so that the body may develop some localization of the infection. Surgical treatment undertaken too soon may produce a marked systemic reaction caused by dissemination of the infection. These disadvantages should be weighed against the definite but slight diminution in development of surgical materiality among those who received sulfonamide therapy in our series.

It would seem that the treatment of acute otitis media and mastoiditis with sulfanilamide should be a hospital procedure carried out under the most careful observation of both the otologist and the internist.

Naselli V. The Modern Treatment of Otosclerosis. *A. J. Otolaryngol.* 1941 33 96

Every form of therapy should preferably be of course be based on pathogenesis but in the absence of specific knowledge of a disease it is often necessary to rely on symptomatic treatment. As far as otosclerosis is concerned symptomatic treatment has hitherto been the rule since the causes of otosclerosis are unknown. Recently there has been an attempt to find an endocrine origin of the disease. The starting point of these efforts has been the knowledge of the pathological anatomy of the disease and its relation to pregnancy.

Attempts at rational treatment of otosclerosis by establishing a sound fistula in the labyrinth as a compensation for the fixation of the stapes have hitherto met with failure. The cause of this failure is that proper mechanical acoustic sound conduction was never established. Investigators such as Holmgren and Sourdille misinterpreted their observations in connection with their operative researches. Of late a shifting has taken place in the diagnostic criteria of otosclerosis with the result that new difficulties have arisen as to the differential diagnosis between otosclerosis and adhesive processes in the middle ear. In Naselli's opinion however the difficulty is a one of no practical importance for he considers the permanent artificial sound conducted by the labyrinth just as effective for fixed stapes as the labyrinth processes for the same component in otosclerosis.

The results of Naselli's tests of the method by which Meyer was recently reported to have obtained splendid improvement of hearing in patients with otosclerosis is the suboccipital withdrawal of a considerable amount of cerebrospinal fluid has been negative. The author observes that Meyer's work is founded on the faulty conclusions arrived at by Holmgren namely that decompression of the labyrinthine fluid in patients with otosclerosis has been proved to increase hearing.

Naselli D. FAUCIANT M.D.

NECK

Ferrari R. C. Lentino A. and Fleming E. A. Clinical Consideration of Total Laryngectomy. (*Clinical Radiology* 1941 5 6)

This report is based on 58 total laryngectomies performed between 1927 and 1941. The time calculation for recovery appears however too short to allow correct figures in a total of 253 laryngectomies only 105 tapers are reported.

Operation is indicated in every endolaryngeal carcinoma with no local or general complication on Radical therapy even with a palliative purpose. It is indicated in cancers which have invaded or destroyed the laryngeal wall when the tumor has infiltrated the neighboring organs or tissues when the cervical gland are enlarged or an extensive glandular involvement has taken place and when the

surgical risk is obscured or exceedingly increased by general complications. Surgical intervention and radiotherapy are both of value in the treatment of localized cancers of the epiglottis. A decision should be based on the microscopic features of the tumor. Operation is indicated in the case of a highly differentiated tumor, and x-ray treatment when anaplasia prevails.

An accurate critical account of the different surgical procedures, including the types of operations (whether simple, extensive, or complicated laryngectomies) and the number of stages in which they were done, is given. The procedure used by the authors was as follows:

The patient was placed under local anesthesia with 1 per cent novocaine but without adrenaline. A cutaneous incision in the shape of a horizontal H was made: the two transverse incisions, on the hyoid bone and on the cricoid cartilage, respectively, were inserted on a median longitudinal incision. A free exposure was made, and the cutaneous flaps were folded on their bases. After bilateral ligation of the lingual arteries in the Bêclère triangle, section of the mylohyoid and hyoglossus muscles up to the level of the cricoid was performed. Median section of the thyroid gland was performed if the isthmus disturbed the operative field. The larynx and trachea were well exposed, the latter for 1 or 2 in. A heavy anchor suture was made between the first and second cartilage of the trachea. This was severed from the cricoid ring with a sharp scalpel. The stump of the trachea was securely sutured to the skin through a

supplementary transverse incision in the supra-sternal notch, deepened as a tunnel with curved scissors. A preliminary tracheotomy may be performed if there is total obstruction of the larynx, or if a state of chronic bronchitis is maintained by a partial obstruction. The posterior wall of the larynx was dissected from the esophagus as high as the arytenoid cartilages. The constrictor muscles were cut and ligated. The pharynx was severed from the larynx by a transverse incision. The larynx was extirpated, the pharynx being left open in front. All the muscles inserted on the hyoid bone were divided. Section of the epiglottis and of the base of the tongue was performed and the pharynx closed with a double-layer suture made with 00 chromic catgut. The pharyngeal wall was secured to the mucous membrane of the tongue. A feeding tube was then inserted through the nose and passed into the pharynx under the surgeon's control. A silk or linen skin suture was used. Drainage was instituted through gauzes packing the suprahyoid fossa and the pharyngeal recesses.

Union generally took place by second intention, between the twenty-fifth and forty-fifth days. The pharyngeal suture separated in the majority of the cases, the size of the resulting fistula was generally small and required only cauterization or curettage of the walls. In a few cases a secondary plastic operation was required.

Within six months, practically every patient had again learned how to speak with a phonation tube.

EMANUELE MOMIGLIANO, M.D.

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS CRANIAL NERVES

Ascroft P. B. Traumatic Epilepsy After Gunshot Wounds of the Head *E t M J* 941 739

The case histories of 317 patients all of them soldiers in the war of 1914 to 1918 were reviewed for this article. All of the injuries were gunshot wounds and only cerebral (no cerebellar) injuries were included. Of these 317 men 107 (34 per cent) were suffering from convulsive seizures four years or more after the war. Thirty three of the 107 were having major convulsions with a focal onset frequently with an aura. Many cases of *petit mal* like wise were of focal onset.

It was found that fits were twice as frequent in those cases of cerebral injury in which the dura mater was penetrated compared to those in which there were no dural tears. Patients from the brains of whom metallic foreign bodies had been removed surgically were much more commonly epileptic than those who retained the foreign bodies no doubt this was due to the added cerebral trauma of removal of the bullet or shell fragment. Reliable data concerning the effect of driven bone fragments were lacking. Scalp wounds of all kinds are followed by epilepsy in 24 per cent of the cases a high percentage this was probably due to the fact that such scalp injury caused by a metallic missile of warfare produces a more severe underlying brain injury than does the usual scalp injury of civilian life. As would be expected epilepsy is more prevalent in those patients who had had septic cerebral wounds. Although epilepsy is probably more certain to follow direct injury to the sensory motor cortex than to some area removed from the Rolandic zone yet all in all the exact site of cortical damage did not seem to have such an important bearing on the production of fits. Immediate unconsciousness after cerebral gunshot wound did not influence the subsequent liability to epilepsy. The first seizure may occur within a few hours or as late as twenty years after injury. Usually the onset of the convulsions is sometime during the first two weeks after injury.

JOHN M. M.D.

Lassen H. C. A. and Vanggaard T. Spontaneous Subarachnoid Hemorrhage *A t m d S d* 1941 1 7 391

This article is introduced by Scandinavian authors with a fairly large number of cases (43). Their clinical studies seem to have been very careful and very thorough. However the post mortem findings are either absent or quite inconclusive which leaves the burden of proof more or less on clinical grounds.

The subject of subarachnoid hemorrhage has received considerable careful attention in Denmark and is fairly well understood. The material com-

prises 43 patients with spontaneous subarachnoid hemorrhages who were admitted to 4 hospitals in Copenhagen between 1932 and 1939. Cases of traumatic hemorrhage were not included. The disease is rare in the first decade of life and after sixty years of age. One half of the patients were under forty years of age. Males and females were more or less equally affected. Incidents which brought on the hemorrhage were usually concerned with increasing intracranial pressure such as physical exertion of one kind or another. Headache was particularly violent and of an apoplectic character in 42 of the 43 patients and in half of the patients consciousness was lost. Practically all the patients had rigidity of the neck. The blood pressure was not affected materially and focal signs of various kinds were seen in most of the patients. Only a few were examined ophthalmoscopically and in the very little was seen.

The course of the disease was marked by a gradual rise in temperature with the return of consciousness and the disappearance of focal symptoms. Evacuation of spinal fluid was considered to be of therapeutic value and in no case were symptoms observed that could be interpreted as being due to renewed bleeding within the cranial cavity.

Of the 12 patients who died in the hospital only 6 were examined post mortem and in none was an aneurysm verified. One patient was suffering from a thrombopenia and from a hemorrhagic pachymeningitis. With regard to the prognosis it was felt that those patients who had no relapses within the first three months were likely to fare very well whereas those in whom there were repeated attacks and especially those in whom there was profound unconsciousness were likely to fare badly.

A. IENVERG, M.D.

Furlow L. T. Ca. A. D. and Watt, n. b. g. C. Spontaneous Cerebral Hemorrhage *S t j* 94 9 758

The authors report 5 cases of spontaneous cerebral hemorrhage which were submitted to surgical exploration and evacuation of either clotted blood or in some instances of fluid. They point out that the form of treatment should not be employed in primary subarachnoid hemorrhage cerebral embolus and cerebral thrombosis. In case of subarachnoid hemorrhage there was definite evidence of increased intracranial pressure which increased cerebrospinal fluid pressure. The diagnosis was markedly slow and the blood pressure changes.

In 4 of the 5 cases submitted to surgery a satisfactory result was obtained in 4 with evidence of hemiplegia subsidence of the choking of the optic nerves and improvement in the mental status of the patient. In the case of the fifth patient who did not survive it was believed that a successful result

would have ensued, except that operation was too long delayed and this had caused complete obstruction to the foramina of Magendie and Lushka. It was believed that the internal hydrocephalus which developed resulted from the presence of blood in the subarachnoid space.

The authors state that in certain instances operative procedures should be employed, but only (a) when conservative measures have failed to produce improvement, (b) when there is some definite evidence of increased intracranial pressure, or (c) if the presence of arteriosclerosis and hypertension does not constitute a contraindication to operation.

JOHN W. EPTON, M.D.

Carrillo, R. Cisternal Hernias of the Paramedian Line (Hernias cisternales de la linea paramediana) *Rev. Asoc. med. argent.*, 1941, 55, 339.

There are three paramedian cisterns in the brain: Bichat's cistern, the interhemispheric cistern, and the olfactory cistern. Hernia of brain substance into any of these cisterns may occur. The hernia is usually the result of tumor or abscess of the brain. It may also be caused by chronic subdural hematoma, though this is generally not so serious as hernia caused by tumor or abscess.

The anatomical relations of these cisterns are described in detail and they and the different forms of hernia are illustrated by photographs.

Bichat's fissure is located at the base of the brain surrounding the cerebral peduncles at the point where they enter the brain. It is generally admitted that this cistern does not communicate with the ventricles. In some cases, though not generally, there is an opening between the lateral ventricle and Bichat's cistern. This permits the passage of iodized oil from the ventricles to the basal cisterns, which has been demonstrated by ventriculography. Hernia of Bichat's cistern is generally from the hippocampal convolution and sometimes it extends beyond this cistern and invades the others. Unilateral hernias of this cistern may be caused by tumors of either the temporal or frontal lobe. The tumor may be at a great distance from the cistern. The perifocal edema of brain abscess may also cause these hernias. Bilateral hernias are not so large or so serious. They are generally caused by the generalized edema of the brain which is characteristic of tumors of the posterior fossa.

The cerebral peduncles are displaced and distorted by these hernias, which results in serious functional disturbances of the sympathetic centers of the region. The cerebral artery which surrounds the peduncle is compressed, this compression causing the symptoms of a decreased blood supply. The symptoms caused by the hernia are entirely independent of those due to the original disease which causes the hernia, such as a tumor or abscess. There is also direct pressure on the intrapeduncular part of the pyramidal tract. The centers which control the movements of the iris are injured and the cerebral peduncle may be sectioned functionally. Pres-

sure is exerted on the optical tract, the ventricles are deformed, and the tentorium cerebelli may be pushed up or down.

Acute hernia of Bichat's cistern may cause bulbar symptoms from pressure on the sympathetic centers. Pupillary disturbances are frequent in these hernias, particularly if the hernias are in the middle or posterior part of the hippocampus. In strangulated hernia there is anisocoria. These hernias may cause rigidity of the neck and various paresthesias due to compression of the peduncle and the island of Reil. If the course is very rapid there may be disturbances of respiration and heart action which may simulate angina pectoris. If the mesencephalon is affected there may be black vomit. Progressive fever may develop and if so the patient dies in cyanosis. In the chronic form there is a certain degree of rigidity of the neck and an abnormal position of the head, and a spastic hemiparesis, chiefly facial. There may also be such conditions as atypical hemianopsia, extrapyramidal symptoms, and anisocoria with Argyll-Robertson pupil.

Hernias of the interhemispheric cistern are generally small. Large ones may be caused by meningiomas of the convexity. If they are associated with hernias of the cisterns of Bichat and Galen the whole of the cortex surrounding the corpus callosum may be involved. It is not known whether acute hernias of this cistern cause symptoms due to the hernia itself.

The olfactory cistern lies above the olfactory bulb. Small olfactory hernias occur not only in tumors of the hemispheres but also in tumors of the posterior fossa. This explains the olfactory symptoms, even to complete loss of the sense of smell, sometimes seen in tumors of the cerebellum, and also explains some mistaken differential diagnoses between tumors of the cerebellum and tumors of the frontal lobes.

AUDREY G. MORGAN, M.D.

Ingraham, F. D., and Campbell, J. B. Dangers of Radiation Without Biopsy of Brain Tumors in Children. *New England J. Med.*, 1941, 224, 925.

This is a case report dealing with the dangers of x-ray therapy without a biopsy in brain tumors, and the disastrous results which may follow this practice. Five or six years ago, the idea was put forth that certain midline tumors with a short history in young children were almost certainly medulloblastomas, and that as these were radiosensitive the children could be spared the ordeal of a cerebellar exploration by instituting x-ray therapy immediately. This article shows rather clearly that this idea is full of fallacies. The authors are fair enough to point out, of course, that a disaster does not invalidate the method, but they are very much of the opinion that a case of this kind is almost sufficient reason for not continuing blindly with the non-surgical treatment of these patients, and believe that in this particular case the child was under very careful supervision—much better supervision than could be expected in less central and less carefully supervised hospitals.

INTERNATIONAL ABSTRACT OF SURGERY

They contend that if the personnel of the hospital clinic where this occurred were able to make this mistake it could be very likely to occur elsewhere.

The case was an eight year-old girl who entered the clinic with the complaint of headache vomiting and unsteadiness of gait for more than two years. Two months after the beginning of her illness she entered another hospital with the complaint of which suggested rightly or wrongly a malignant cerebellar tumor. The diagnosis of medulloblastoma was made and x ray treatment was instituted. At first the child responded well to the treatment but after a short time no response was obtained and the treatment was discontinued. When she entered the care of the authors she was almost blind and so unsteady that she could scarcely walk. A cerebellar exploration was performed which revealed a typical cystic astrocytoma of the left hemisphere. Such a tumor as this of course is not particularly radiosensitive but the difficulty lay in assuming that it was some other sort of tumor. The delay in this case cost the child her eyesight and the authors are very much of the opinion that cases of this kind should have cerebellar exploration with decompression and of course a biopsy should be performed at the time of the operation. Under these circumstances it would be perfectly safe to give x ray therapy but if the error outlined is frequent and there is no particular reason why it should not be the damage done would far exceed any value that might pertain to saving short exploratory operations in these children.

The authors are of the opinion that treatment of midline cerebellar tumors (presumed to be medulloblastomas) by x ray therapy is not the common practice in the United States in general but is more or less confined to Boston and its environs.

ADRIAN VERBRUGHE MD

Munro D Pain in Cancer of the Face Jaws and Neck
Arch Surg 94 224 049

The effect of neurosurgical procedures on the pain associated with cancer of the face jaws and neck is analyzed.

Thirty cases are reported. In only one of these patients obtained relief and were alive at the end of any significant follow up period.

Evidence is presented to demonstrate that the development of pain in such cancer bearing areas is associated with x ray therapy.

Neurosurgical or any other procedures will almost certainly prove useless in the relief of this type of pain if provided only after the cancer has metastasized locally.

It is strongly recommended that surgical denervation of the cancer bearing areas in the face throat neck and jaws be performed as the first step in the treatment of the malignant growth not only as the prophylaxis against later pain but also as an aid to the greater efficiency in the therapy of the cancer because of the associated local anesthesia that is thus produced.

JOSEPH K. NAKAT MD

Dandy W E Results of Removal of Acoustic Tumors by the Unilateral Approach
Surg 1941 42 1026

Since 1934 Dandy has totally removed 46 tumors of the acoustic nerve with a mortality of 10.87 per cent. He has had no instance of recurrence.

Because of the severity of any operation upon the contents of the posterior fossa it is deemed safer to use only a unilateral exposure. Access to the angle is just as good as less shocking to the patient and is labor saving for the surgeon. In order to relieve supratentorial pressure the posterior horn of a lateral ventricle is tapped before extirpation is attempted. Then the arachnoid of the cisterna magna is opened and the cisterna is drained. Following this the outer cap of the cerebellar hemisphere (from 10 to 15 gm) is removed. Then with adequate cotton pledget protection of the brain stem and lower cranial nerves the tumor may be exposed. Accumulations of cystic fluid over the tumor are drained and superficial capsular vessels are clipped. The capsule is split the contents are thoroughly removed by curettage and the capsule is teased free from the brain stem and attached cranial nerves.

There is frequently a nodule of tumor extending with the internal acoustic meatus and when this is suspected to be true a chisel is used to remove the posterior lip of the meatus to give access to the nodule. The eighth nerve is always lost and in a complete removal the seventh nerve must be sacrificed. When facial paralysis results together and a spinal accessory facial nerve anastomosis is done in from ten days to two weeks. Throughout the period of recovery from facial paralysis the lids are kept closed. JOHN MARTIN MD

SPINAL CORD AND ITS COVERINGS

Quezada J J The Technique Indications and Result of Myelography (Technique and Indications)
Surg 1941 42 1026

Quezada reports his experience with myelography and states that he eliminates gas shadows by giving an enema and an intramuscular injection of pitressin. He takes an anteroposterior and a lateral roentgenogram of the spine and injects 2 c.c.m. of lipiodol into the cisterna magna. By means of fluoroscopy he observes first the descent of the opaque substance into the spinal canal while the patient stands erect and then its ascent while the patient is in the Trendelenburg position. If the lipiodol is stopped in the anterior or posterior and late anteroposterior views are taken in the Trendelenburg position. The patient is then placed in the Trendelenburg position and anteroposterior and late anteroposterior views are taken in the Trendelenburg position. The patient is then placed in the Trendelenburg position and anteroposterior and late anteroposterior views are taken in the Trendelenburg position.

Neolipiodol gives better results than lipiodol because it produces more opacity and being more fluid is easier to handle. Only fresh iodized oils

should be used, 2 c cm are usually enough to make a diagnosis, and a dose of 5 c cm is reserved for special cases. The injection of from 2 to 5 c cm of fresh lipodol into the subarachnoid space causes moderate pain at the level of the sacrum and coccyx, in some cases, the pain persists for several weeks and then disappears spontaneously. There is immediate moderate hyperemia around the site of injection, later, round cells and fibroblastic proliferation appear around the droplets of oil which are finally encapsulated and form milium nodules on the surface of the spinal cord. If thorotrast is used, Nichols and Nosik recommend drainage of some of the cerebrospinal fluid, which eliminates a large proportion of the injected radio-active substance. The injection of air as contrast substance is condemned because it gives very little opacity and makes roentgen interpretation difficult, but it acquires great importance in the diagnosis of blocks when injected below the site of the supposed lesion.

Myelography is indicated in spinal traumatism and in a number of non-traumatic cases. The traumatic group includes vertebral dislocations, fractures, and ruptures of the intervertebral disc, the latter occurring usually in the lumbar segment. When a patient presents the well known symptoms of spinal traumatism, it is necessary to differentiate between concussion, contusion, compression, and section of the spinal cord. The most valuable diagnostic data will be given by myelography, which will show the exact site and extent of the lesion and whether there is partial or complete block. An excellent procedure is to make a spinal puncture below the site of the lesion, extract some cerebrospinal fluid, and inject an equal amount of air, if there is no block, the air will ascend in the canal and produce the typical headache of pneumo-encephalography, if there is block, the cerebrospinal fluid soon ceases to flow, the air does not enter easily, and there is no headache. In cases of concussion and contusion, there is no block, in cases of hemorrhage, or compression or section of the cord, there is block or deformation of the picture. In non-traumatic cases, the neo-iodipin may be completely or incompletely arrested, according to the kind and degree of the obstacles. The latter may be caused by intradural tumors and adhesions, extradural changes in the vertebral bodies from tuberculosis or cancer, or deforming spondylitis.

Neo-iodipin may act as a therapeutic agent also, especially in detaching blood clots which cause block, as observed in 1 of the 13 reported cases. Emergency laminectomy is being abandoned, the present tendency is to make a roentgen study of the patient so that the surgeon may adopt the most appropriate line of conduct.

RICHARD KEMEL, M D

Browder, J., and Meyers, R. Pyogenic Infections of the Spinal Epidural Space. *Surgery*, 1941, 10 296

goal by means of direct extension of the infection, or by means of septic metastasis, the authors reiterate their original contention that all such lesions are preceded by vertebral osteomyelitis.

Patients developing an abscess of the spinal epidural space will first complain of a localized back pain, tenderness at a definite spinal level, local swelling, and a feeling of ill-being. Fever may range from 101 to 105°, there is frequently a very high leucocytosis, and root pains producing a "painful girdle" may be prominent symptoms. It may be several days before the final, dramatic symptoms set in, those of rapidly developing paralysis of the muscles of the lower extremities, and loss of bladder and bowel function. Sensory changes vary from patient to patient, but there is a rapid appearance of flaccidity and areflexia. Trophic changes in the skin are common. The spinal fluid will usually show a large number of lymphocytes unless the process has managed to break through the dura, when there will be evidence of a frank meningitis. The Queckenstedt test usually reveals a partial or complete subarachnoidal block of the fluid.

The authors have revealed some very interesting and typical pathological changes which accompany epidural abscesses of the spine. The exposed, osteomyelitic vertebrae have a shaggy, fenestrated, loosely-applied periosteum. The involved pedicles and laminae are soft and may exude pus when they are grasped by the rongeur. Creamy pus sometimes wells up from the extradural spaces below the bone. In some cases no pus, but only dense granulomatous tissue is found, the removal of which from the underlying attached dura may be very dangerous because of the likelihood of a tear in the dura. The dura itself is frequently very greatly thickened under such a mass, and might even contain punctate abscesses.

At autopsy the gross appearance of the cord may be entirely normal, but though it is not frequently flattened or otherwise distorted at the level of the lesion, it is obviously soft to palpation, and section reveals a loss of normal architectural features, so that gray and white matter are not distinguishable. Spongy, vacuolated areas within the substance of the cord suggest an impairment of the intrinsic circulation of the cord. The glial elements do not appear to be as severely implicated as the neural. The blood vessels of the pia and spinal cord may be thrombosed, but more commonly they are unchanged or only engorged. Intramedullary thrombosis is probably not as common as theories suggest.

The authors believe that it is not correct to ascribe the neurological changes to the factor of pressure alone, for the relief from pressure by laminectomy does not frequently produce a rapid recovery or the good results which decompression should afford were pressure the main causative factor. Local deformation of the cord is not usually shown to be present in the freshly autopsied cord. "The pathological demonstration of irreparable parenchymatous changes within the spinal cord is not explicable in terms of pressure alone. The most that

Against the common theory that pyogenic infection in the spinal epidural space usually reaches its

may be said at the present with respect to these pathologic changes in the spinal cord is that they are the result of circulatory alterations within the cord itself

JOHN MARTIN M D

Echols D H Emergency Laminectomy for Acute Epidural Abscess of the Spinal Canal S & Y 1941 87

Judging from the limited discussion in the literature concerning acute epidural spinal abscess one might conclude that the condition is rare but the author believes that not the disease but rather its recognition and surgical treatment are rare. In most instances the abscesses are located posteriorly though they may extend laterally into the fat-filled epidural spaces of the spinal canal and they may extend over any number of segments in the epidural space this space extending normally from the cervical to the upper sacral levels. The most usual location it seems is in the thoracic spine. Most such abscesses arise by metastasis though the blood stream from furuncles of the skin and the commonest organism is the staphylococcus. A history of boils, localized spinal tenderness and the rapid development of paraplegia with loss of bladder function is strongly suggestive of acute spinal abscess. There may also be a low fever and frequently there is a high white count. It may be necessary to differentiate an acute myelitis or a polymyelitis but this is easily done if a Queckenstedt test is performed for in the presence of an abscess there will almost invariably be a block. Naturally a spinal tap could not be done with passage of the needle through infected tissue if the abscess were suspected of being in the lumbar area.

Treatment is immediate laminectomy as soon as the diagnosis is made. There is a complete removal of all bone plus granulation tissue and cellular debris no matter how many segments are involved. The wound is to be loosely closed and a drain is left in place. Such wounds may be long in healing and filling with healthy granulation tissue but neurological recovery usually begins within a few days if the patient is going to get well at all. The author reports 4 cases which he has recently treated with a mortality (from empyema many weeks later) of 5 per cent.

JOHN MARTIN M D

De Gennaro R Chordotomy (Laminotomy) Ch & H 1940 59 497

This article concerns general surgery and the surgical treatment of pain and especially with the operation of chordotomy. A generous review of Italian, French, German, English, and American literature is given and the anatomophysiological basis of the operation is discussed at length. The Italian surgeon, Cossu, is given the credit for initiating at the present day surgical attempts at the control of intractable pain.

Chordotomy is not an easy operation but it can be safely done by an experienced operator. It is indicated only when the pain is not controlled by other means and when the pain is truly organic in

nature. It is especially useful in many painful conditions in which the pathology lies below the level of the diaphragm. Inoperable lesions of a carcinomatous or sarcomatous nature located in the gastrointestinal or genito-urinary tracts, the bones of the legs, the vertebrae, lungs, or spinal cord itself have the world over been treated by this operation with most gratifying results. The pain of tabetic crises is particularly amenable to chordotomy. It has also been used for persistent neuritis and neuralgia of various sorts, either idiopathic or post-traumatic for the pain of kraurosis of the vulva, and for the pain of amputation stumps. Its primary indication remains however the alleviation of the pain of tabetic crises and of primary or metastatic malignant inoperable tumors.

Following chordotomy there should be no motor or trophic loss, no loss of deep sensibility, and usually no loss of touch. The operation should be done with bilateral incisions in the cord placed at a sufficiently high level to include all fibers ascending from the level of the pain. A carefully performed small laminectomy with adequate attention to complete closure of the dura mater muscles and fascia is equally as important as the careful handling of the spinal cord. Complications may arise postoperatively such as a complaint of residual pain, loss of bladder control (this is usually transient), occasional rectal incontinence, and still less frequently a diminution of libido and potency. The operation itself carries a very low mortality rate since it may be done if desired under local anesthesia.

The author believes that chordotomy when indicated is much more satisfactory and rational than a number of other half-way measures which are so frequently used. Chordotomy is one example of the value of applied anatomy and physiology and the fortunate location of the spinothalamic tracts makes the operation possible.

JOHN MARTIN M D

PERIPHERAL NERVES

Giangras G The Use of Rubber Laminar Plastic Bridge of Experiment in Nerve Lesion (Mistake in the use of the term "laminar plastic" in the title of the paper) A Ital J 1941 9 56

The author resected 2 cm of the sciatic nerve in 3 rabbits and a number of dogs. He bridged the gap between the proximal and distal segment of the severed nerve by means of a sterile sheet of rubber 4 cm by 1 cm which he cut out of discarded gloves. He wrapped the rubber sheet like cigarette paper around the two ends of the nerve and sutured it to the perineurium of the two ends either with catgut or very fine silk. Within ten days regeneration had started and the first continuity was established within twenty days. By the end of the second month nerve function began to return.

Clinically this method was used successfully by Muir in a lesion of a radial nerve. No details of the case are given.

DAVID IMPASTATO M D

SYMPATHETIC NERVES

Nicolosi, G. Gastroduodenal and Hepatolienal Circulatory Disorders Following Lesions of the Abdominal Sympathetics (Disordini circolatori gastro-duodenali ed epato-splenici da lesioni del simpatico addominale) *Arch ital di chir*, 1940, 58 95

Investigating both clinically and experimentally the important and much discussed matter of circulatory disorders of the stomach, duodenum, liver, and spleen following destructive lesions of the abdominal autonomic nervous system, the author attempted, by means of the experimental production of lesions of the sympathetic nerves to these organs, to reproduce in animals what is so frequently and, possibly, hypothetically (?) reported in man. The animals used by this worker were 10 dogs and 10 guinea pigs. The lesions were produced by injections of aqueous solutions of lead acetate or phenol which

were made into the adventitia of the portal and gastrolienal vessels.

Interruption of the sympathetic innervation of the portal veins and gastrolienal arteries by means of such necrotic processes as the injection mass caused, resulted in a marked circulatory disturbance of the stomach and upper small bowel, of the liver, and of the spleen. Hematemesis, melena, ulcer formation in the gastric and duodenal mucosa, and foci of severe necrosis of the liver and spleen parenchyma were promptly observed. Whether this was primarily the result of a hormonal dysfunction due to the nerve destruction, or whether it was a result of circulatory embarrassment to these organs, did not seem to be entirely established. It was certain, however, that known lesions in animals produced effects directly comparable to verified pathology in man after injury of the abdominal sympathetic vascular mechanism.

JOHN MARTIN, M.D.

SURGERY OF THE THORAX

CHEST WALL AND BREAST

Saphir O and Parker M L. Metastasis of Primary Carcinoma of the Breast with Special Reference to the Spleen, Adrenal Glands and Ovaries. *Arch Surg* 1941; 42: 1003

There are amazingly few contributions in the literature dealing specifically with the sites of metastasis of primary carcinoma of the breast. Leading textbooks and comprehensive studies of tumors in general and of cancer of the breast in particular refer to the more general sites of metastases such as the lungs, liver and bones. Much of this material is rapidly becoming obsolete since it comes from the time when only macroscopic evidence of metastasis was available. With modern methods of investigation at command such as histological studies and post mortem examinations it is possible to go beyond mere clinical reports and to determine more accurately the distribution of metastases of primary carcinoma of the breast.

The authors have made a careful study of material available in the Department of Pathology of Michael Reese Hospital in Chicago with special reference to the sites of metastasis of carcinoma of the breast. The material covers reports on 43 autopsies on patients with primary carcinoma of the breast together with histological examination of the various organs to determine whether gross tumor involvement was present. Their investigations showed the lungs to be the most common site for metastatic lesion, such involvement occurring in 28 instances; the liver came next with involvement in 4 instances. The adrenal glands, the spleen and the ovaries showed involvement in surprisingly large numbers. Metastatic involvement of the adrenal glands was present in 10 instances; of the spleen in 10 and of the ovaries in 3. A survey of the relatively many reports of individual cases and of the few cases of metastasis to the spleen or ovary on record would tend to give the impression that involvement of these organs is rare. Evidently the frequency of metastases of various kinds has been studied by different investigators but the figures vary widely and depend on whether they are derived from clinical or autopsy reports. A recent study of metastasis of cancer of the breast by Warren and Witham (1933) included 16 cases. In these the spleen was found to be involved 23 times and the ovaries 15 times. Because of their findings Warren and Witham concluded that the spleen's frequent involvement of the spleen gave little credence to the assumed resistance of the spleen to cancer development. The results obtained by the authors of this article seem to substantiate this statement.

Another fact brought out clearly by the histological study of this series is that the type of carcinoma definitely is not responsible for the shorter

or long survival period of the patient nor for the appearance, spread and number of metastases. However regardless of the type of carcinoma the presence of isolated tumor cells separated from primary by a structure of the carcinoma indicates a high degree of malignancy. Carcinomas consisting of such isolated and diffusely infiltrating tumor cells were often those which produced metastases in the spleen, adrenal glands and ovaries.

The authors place great emphasis on the occasional small and clinically unnoticed carcinoma which may give rise to widespread metastases. Several cases are cited which clearly demonstrate the known fact that a small or unnoticed carcinoma of the breast may cause diffuse metastases. The clinical picture in these cases was frequently misleading so much so that the small primary tumors were not recognized either by the patient or by the physician.

MARTIN J. SEITZ, M.D.

Albrecht L. Healing in Cancer of the Breast Radically Operated upon between 1927 and 1939 in the Goettingen University Surgical Clinic with Reference to Pre-operative and Postoperative Irradiation. (Deutsche Zeitschrift für Chirurgie) 1940; 135: 239-250. G. Th. G. Chirurgisch. U. r. u. t. k. k. k. weg. n. Brust. eb. R. d. k. l. p. e. n. e. r. u. t. k. k. k. g. u. n. d. p. t. p. t. i. v. e. u. d. p. r. e. p. t. p. e. r. a. t. e. n. B. s. t. r. h. o. G. o. e. t. t. i. n. g. e. n. D. e. r. t. a. t. 1940.

This report embraces 374 who underwent radical operations for cancer of the breast. The follow-up investigations were obtained by questionnaires. Only 355 patients answered. The developmental phases of cancer were given in accordance with the Juengling 4 group classification. The majority of the patients were already in the third developmental stage, i.e. the axillary lymph nodes or the skin and pectoral muscles were markedly involved. Only during the last seven years was pre-operative actinotherapy applied in this clinic; after it was proved that pre-operative irradiation did not complicate the operation. It was found in most instances that the tumor was more circumscribed after the pre-operative irradiation. The method of the Frankfurt Clinic was employed: the irradiation was done two or three weeks before the operation and four weeks after the operation; then eight weeks later the first postoperative investigation was made. After this the patients were required to report every three months, then every six months, and finally after three years they were asked to report once a year. In 1 tabulations the author presents the statistics on the 355 patients according to 20 classifications.

Within the first five year period 87 or 24.7 per cent were living. Of the patients treated by pre-operative and postoperative irradiation only 19.1

38 per cent were dead. During the same period 70.6 per cent of the patients who were operated only were dead. Of those irradiated postoperatively only, 59.6 per cent were dead. During the five-to-ten-year period only 12.4 per cent of all the patients were living. There were 125 (58.4 per cent) deaths due to cancer metastases, 116 of these (54.2 per cent) occurred within five years, 5 (2.3 per cent) patients still had cancer despite the five-year cure. Deaths due to intercurrent diseases amounted to 58 or 27.1 per cent.

The pre-operative irradiation apparently was of little influence in producing a later regression of the cancers in these cases. However, the patients subjected to pre-operative and postoperative irradiation suffered the least. Of the latter 38.8 per cent were living within the five-year period, apparently healthy. It is noteworthy that of the patients who were irradiated only pre-operatively, 2.4 per cent suffered increased disturbances during the course of the healing of their wounds. Pre-operative and post-operative irradiation of cancers yields the best results.

(GRANZ) MATTHIAS J SEIFERT, M D

TRACHEA, LUNGS, AND PLEURA

Eloesser, L. The Choice of Procedure in the Treatment of Tuberculous Cavities. *J Thoracic Surg*, 1941, 10: 501.

Eloesser has called attention to the three fundamental methods in treating tuberculous cavities—collapse, compression, and aspiration, and points out that they frequently fail to close cavities. In searching for an answer, he has undertaken the study of intracavitary pressures, both on cadavers and living patients. He has found that the pressure in pulmonary cavities varies accordingly as their communicating bronchi are temporarily open or closed. This pressure is higher than atmospheric pressure most of the time and it keeps cavities distended. Proof of a blocked bronchus is afforded when intracavitary pressure remains elevated while the patient holds his glottis open and stops breathing.

Eloesser advocates the needling of cavities, provided always no free pleural space exists, in order to determine intracavitary pressure. The open cavities are amenable to thoracoplasty and the closed cavities probably are not.

Closed cavities with increased pressure may be closed by aspiration of the air followed by immediate thoracoplasty, or may be treated by a skin-flap drainage method, or by continuous suction drainage (Monaldi procedure).

JULIAN A MOORE, M D

HEART AND PERICARDIUM

Montanari, G, and Jadevaja, F. Surgical Revascularization of the Heart (La rivascolarizzazione chirurgica del cuore). *Ann ital di chir*, 1940, 19: 357.

In 1922 Robertson proved experimentally that a new blood supply can be furnished to the myocardi-

um through anastomoses between the vessels of the heart and those of the thoracic viscera. The authors review the work done on the subject since that time and describe their own experiments on 10 rabbits. They occluded some of the coronary arteries and then placed over the heart, in some cases, grafts from the pectoralis minor muscle and, in other cases, grafts of lung tissue. In some of the cases they placed the grafts over the pericardium and in others they removed a part of the pericardium and laid the grafts directly over the myocardium. Photomicrographs of the histological findings are reproduced.

Both kinds of grafts took and with both there was a marked increase in the number of myocardial vessels near the grafts and ectasia of the pre-existing vessels extending for some distance from the grafts. There was little difference in the effect of the two kinds of grafts, but the technique of the lung grafts is somewhat simpler and there seems to be less chance that they may ultimately interfere with the movements of the heart. These results were obtained, however, only in the cases in which the grafts were applied directly to the myocardium. When they were applied to the pericardium, adhesions formed but there was little effect on the circulation. Apparently, stimuli pass through the grafts to the myocardium, affect its vitality and metabolism, and help to re-establish the circulation.

The animals bore the experiments very well and it seems justifiable to use the method on human beings when there is an insufficient blood supply to the myocardium. In view of the importance of functional stimulation in the taking of a graft, it would seem that the conditions should be more favorable for the establishment of a collateral circulation in human beings, in whom the coronary circulation is cut off gradually, than in animals, in which it is cut off abruptly by operation.

AUDREY G MORGAN, M D

ESOPHAGUS AND MEDIASTINUM

Ivanissevich, O, Ferrari, R C, and Lentino, A S. The Surgical Treatment of Cancer of the Esophagus (Tratamiento quirúrgico del cáncer de esófago). *Semana med*, 1941, 48: 1049.

Up to the present time, all medical, physical, and chemical treatments have failed in cancer of the esophagus, and surgery is the only measure which offers some hope in these cases. More than 60 successful esophagectomies prove that cancer of the esophagus can be cured provided that its diagnosis is made early. Therefore, the physician must discard the false notion of the incurability of this disorder and do everything in his power to discover the disease in its early stages when intervention is still useful.

The authors report a case in a man, aged fifty-two years, whose first symptoms of dysphagia dated back two months and who was found to have an esophageal obstruction caused by a tumor which occupied two-thirds of the lumen of the organ 37

cm from the dental arch biopsy showed it to be a papilliferous epithelioma. The patient had lost 20 kgm in weight during these two months. A gastrotomy was performed and after three preliminary sessions of Arce's left pneumothorax at weekly interval the patient was operated upon with a modified Torek technique. The first stage consisted of incision over the seventh rib and extirpation of nearly the entire rib and of part of the sixth and fifth ribs incision of the parietal pleura and then of the mediastinal pleura in front of the thoracic aorta blunt dissection of the esophagus and its section 3 cm above the cardia prolongation of the incision of the mediastinal pleura up to the dome of the thorax blunt dissection of the esophagus above the aorta exteriorization of the esophagus through the incision in the mediastinal pleura above the aorta and completion of the blunt dissection of the upper part of the esophagus and suture of the wound of the thorax without drainage. The second stage consisted of incision along the anterior border of the sternocleidomastoid muscle opening of the sheath of the muscle retraction of the muscle outward and dissection of the posterior aspect of the sheath which exposed the cervical esophagus exteriorization of the esophagus and its section about 3 cm above the tumor by blunt dissection formation of a vertical tunnel under the skin of the anterior aspect of the upper part of the chest and transverse incision of the skin 3 cm wide at the end of the tunnel passage of the esophagus through the tunnel and suture of its terminal orifice to the incision in the skin and suture of the cervical incision. Except for some fever and a subsequent pleural effusion the patient was doing well and healing took place by first intention. A rubber connect on was installed between the esophageal and gastric orifices and at present six months after the operation the patient is in good general condition and has gained 7 kgm in weight. This is the first case of cancer of the esophagus successfully operated upon in Argentina.

The authors give a brief history of the work done on cancer of the esophagus since Nasillo began its study in 1833. Radical surgery was first performed with success by Torek and Zaajer in 1913. Different techniques have been used by different surgeons (Torek and Zaajer, Sauerbruch and Fischer, Ach and Denk and Bie) and 62 successes are reported in the literature including the present case. Nowadays most surgeons prefer the technique of Torek with slight modifications. Various routes are used according to the findings in the cases they are the abdominal thoracic endoscopic abdominothoracic and minicervical and that of Lenthal. In cancer of the cardia or of its vicinity the abdominal thoracic route with section of the diaphragm and cancer of the thoracic esophagus the method of Torek are indicated. Arce's pneumothorax is indispensable in both conditions and physiological section of the phrenic nerve facilitates the intervention especially in the first case. The operation should

always be performed on the left side. Extreme care should be used during dissection to avoid rough traction and sudden maneuvers which have a direct repercussion on the heart and vessels. Vagal death has been reported in these patients if the pneumogastric nerve must be sectioned it should first be infiltrated with novocaine.

Torek and Zaajer have condemned gastroesophageal anastomosis. However extirpation of a cancer of the esophagus should not be followed by immediate end to end anastomosis the stomach may be brought up into the thorax and may provide a useful anastomosis. Postoperative distention of the lung and pleural drainage are helpful complements of the operation. Rienhoff has recommended the injection of a small amount of peptone bouillon into the pleural cavity twenty-four hours before thoracotomy to prevent pleural infection. The indications for endoscopic extirpation are exceptional. Spinal or general anesthesia with cyclopropane is indicated very rarely any other.

RICHARD KEMEL, M.D.

MISCELLANEOUS

Harrington S. W. Diaphragmatic Hernia. *Q. J. Med. Sci. N. S.* 1941, 15, 157.

This subject is of interest to the physician because the diagnosis is of first importance. The symptoms are often complex and diaphragmatic hernia frequently must be considered in the differential diagnosis of diseases of the upper part of the abdomen and lower part of the thorax. It is of interest to the roentgenologist because roentgenological recognition of diaphragmatic hernia is often the only means by which a definite diagnosis can be established clinically. The treatment is of primary concern to the surgeon because operative replacement of the herniated viscera and repair of the abnormal opening in the diaphragm constitute the only treatment that promises complete relief of symptoms.

The types of diaphragmatic hernia are usually classified in three main groups: (1) congenital, (2) acquired, and (3) traumatic. Because of the practical clinical and surgical significance of trauma as an etiological factor the author has suggested that diaphragmatic hernia be classified into two main groups: non-traumatic and traumatic. He has subdivided these two groups according to the various types. The incidence of diaphragmatic hernia probably is increasing steadily as twenty years ago. From 1908 to 1926 (eighteen years) 3 instances of the condition were recognized clinically at the Mayo Clinic and 14 patients were operated on. From 1926 to 1931 (fifteen years) the condition was diagnosed more than 600 times and the author operated on 270 patients. This study therefore shows that 2 times as many diaphragmatic hernias were recognized in the last fifteen years as had been recognized in the previous eighteen years. The author believes that the condition is more common than the present records indicate.

The clinical syndrome of diaphragmatic hernia may be divided into two main types. The first type of syndrome occurs in cases in which the stomach is the only abdominal organ involved in the hernia. Such hernias usually are of the esophageal-hiatus type. The symptoms are those of intermittent and usually progressive incarceration and obstruction of the stomach.

The second type of syndrome occurs in cases in which multiple abdominal viscera are involved in the hernia. This type of hernia usually is of traumatic origin and is caused by laceration of a normal diaphragm. The symptoms in such cases are more varied and severe in character than those in other types because of the multiple structures involved, and they are often more acute in onset. The initial symptom may be that of acute intestinal or gastric obstruction, or severe hemorrhage.

Diaphragmatic hernia is primarily a mechanical condition, and the only treatment which will relieve the condition is operative repair or reconstruction of the abnormal opening in the diaphragm. The indications for surgical intervention and the methods and technique of surgical procedures depend on the type, situation, and size of the defect in the structure of the diaphragmatic muscle, the kind and amount of abdominal viscera involved in the hernia, and whether the viscera are enclosed in the hernial sac.

The operative procedures employed in the 270 cases in this series were as follows:

In 242 cases the patients were treated by radical operation. The herniated abdominal viscera were replaced in the abdomen and the abnormal opening in the diaphragm was repaired. In 147 of these cases the diaphragm was either temporarily or permanently paralyzed preliminary to operative repair of the hernia. In 2 cases it was necessary to perform extrapleural thoracoplasty in addition to the interruption of the phrenic nerve as a procedure preliminary to repair of the hernia.

Twenty-eight patients who had the esophageal-hiatus type of hernia were treated conservatively. In these cases interruption of the left phrenic nerve was done as a palliative or therapeutic measure, in

7 of these it was the only procedure contemplated because radical operation was contraindicated, and in the remaining 21 cases the procedure was in the nature of a therapeutic test. It may be necessary to perform radical repair of the hernia in some of these cases later to obtain complete relief from the symptoms.

Tabanelli, M. A Clinical Study of the Thoraco-Abdominal Reflexes After Trauma to the Parietal Thorax (Contributo clinico allo studio dei riflessi toraco-addominali nei traumi della parete toracica) *Arch. ital. di chir.*, 1940, 58, 388.

Special abdominal symptomatology in certain cases of rib fracture or thoracic contusion is infrequent. The abdominal syndrome usually appears from twelve to twenty-four hours after the trauma.

The author gives in detail the innervation of the thorax and abdomen and then briefly reports on 18 cases of thoracic trauma or rib fracture observed at the surgical division of the Hospital Maggiore of Milan. The abdominal syndrome consisting of defensive muscular contraction and pain in the epigastrium was presented by the cases in which there was trauma at the level of the sixth and seventh intercostal nerves. In the cases in which the injury was at the level of the eighth, ninth and tenth intercostal nerves the abdominal syndrome occurred lower, usually in the hypochondrium, the lumbar area, or the mesogastrium.

If not understood, such a syndrome may at times lead to the mistaken diagnosis of some visceral lesion of the stomach or pancreas. Trauma in the region of the tenth and eleventh intercostal nerves may lead to a defense reaction in the inguinal region, which may be mistaken for appendicitis or renal colic. Thoracic trauma must involve the intercostal nerves in order to cause such defense reactions in the abdomen. The reactions occur on the same side as the injury. The syndrome is of relatively short duration and usually disappears in from twenty-four to forty-eight hours. It is of importance when the possibility of serious visceral injuries is being considered.

JACOB E. KLEIN, M.D.

SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

Robins C R Why Inguinal Hernia Recurs *Ann Surg* 1941 114 118

The persistently high rate of recurrence following operations for the cure of inguinal hernia particularly the direct variety would suggest that there must be something inherently wrong in our method of dealing with it. In very recent years there has been a marked improvement in the reported results particularly those in which the fascial suture is employed.

Bloodgood states that recurrence in the lower angle of the wound whether the hernia be direct or indirect is chiefly due to the fact that the conjoint tendon is weak or obliterated and the ordinary suture or closure of the defect in the abdominal wall is not sufficiently strong. The transplantation of the rectus muscle and its fascia is not a certain cure. A study of this area of muscular deficiency will explain several most interesting problems which must be overcome if cure is to be effected.

In direct inguinal hernia this portion of the internal flat muscle is absent to a variable degree which leaves the entire inguinal canal with an inadequate mechanism for closure. When this defect is present we are likely to have direct and indirect hernias. This explains why it is that direct and indirect

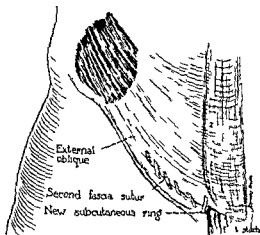


Fig 2 The fascial suture is secured from the pillars of the subcutaneous ring and left attached at the pubic end. The first suture is placed deep bed. The second suture is employed to repair the fascia of the external oblique which has been used to expose the inguinal canal. The second suture is designed to make a new subcutaneous ring. It thus gives a certain amount of support to the underlying tissue and the suture is fascia will not stretch. (Courtesy of J B Lippincott Co.)

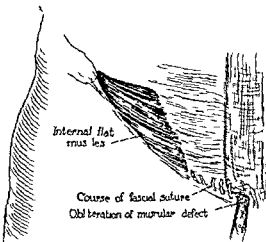


Fig 3 The suture is laid outwards and suture the rectus and the third bed of the internal flat muscles to the pelvic bone—the tibia and Gubernator and Poupart's ligament. This first suture completes muscular shell of which is a tendon to the cord. If the fascial suture goes out the suture can be completed with fine suture chrom catgut. This is usually no particular strain at this point.

inguinal hernias occur in the same individual so frequently.

If the lower segment of the internal flat muscles is sutured only to the inguinal ligament as is usually the case it at once becomes apparent that there is a space left above the smooth surface of the pubic bone to which nothing is attached and the space is not obliterated. It is because this space is left unprotected that operation for direct inguinal hernia is so often followed by prompt recurrence.

To Babcock should be given the credit for the discovery that the superior surface of the pubic bone has a thick ligamentous covering that is several millimeters thick, is densely adherent to the bone and easily admits of suture with the large fascial needles.

The problem is to cure the muscle deficiency. As stated ordinary sutures have proved to be inadequate because they are applied under tension so that eventually only the edges are approximated by these methods and when the muscular tissue is attenuated the suture link is weak.

If use is made of the ligamentous covering of the pubic bone and the McArthur fascial suture is employed the heavy rectus muscle and sheath can be permanently attached to the pubic bone and continued outward so as to make an adequate barrier to

any subsequent descent of the hernia. This fascial suture becomes incorporated in the muscle and fascia and forms a permanent attachment to the pubic bone and to the other tissues to which it is sutured. We have, thus, the strongest tissues permanently applied to the weakest spot.

GEORGE A. COLLETT, M.D.

GASTRO-INTESTINAL TRACT

Ludden, J. B., Flexner, J., and Wright, I. S. Studies on Ascorbic-Acid Deficiency in Gastric Diseases. Incidence, Diagnosis, and Treatment. *Am. J. Digest. Dis.*, 1941, 8: 249.

The four chief factors that contribute to Vitamin C deficiency in general are (1) insufficient dietary intake, (2) increased metabolic requirements, (3) rapid destruction in the gastro-intestinal tract, and (4) diminished absorption from the gastro-intestinal tract. This study was undertaken to determine the relative importance of these factors in producing Vitamin C deficiency in patients with gastric disease. Twenty-eight patients with various gastric disorders were studied. These disorders included various forms of gastritis, ulcer, functional disturbances, and gastric resections.

Vitamin C tissue-saturation studies as well as ascorbic acid blood studies were made on all patients and were continued for periods ranging from three weeks to three months.

Dietary histories of all but 1 of these 28 patients revealed them to be low in Vitamin C. One patient had frank scurvy and 26 had subclinical scurvy, as indicated by the tests.

The oral administration of from 1.5 to 4 gm. of ascorbic acid over a period of from three to seven days following an intravenous test dose of 1 gm. was sufficient to bring the plasma values of 25 of the 28 patients into the normal range of saturation. The other patients required from 5 to 11 gm. of ascorbic acid over a period of from eight to seventeen days.

The daily oral requirements of Vitamin C needed to maintain saturation ranged from 75 to 200 mgm. The larger dose was necessary for a patient with subtotal gastrectomy.

The authors believe that gastric lesions *per se* do not impair absorption of ascorbic acid when taken by mouth unless there is an associated achlorhydria or diarrhea. Alkali and buffer therapy failed to interfere with the absorption of ascorbic acid.

Insufficient dietary intake of Vitamin C is the major factor contributing to Vitamin C deficiency in this series of patients with gastric disease.

HOWARD A. LINDBERG, M.D.

Buisson, M. Considerations in the Early Diagnosis of Gastric Carcinoma (Attualita in tema di diagnosi precoce del carcinoma gastrico). *Minerva med.*, 1941, 32: 377.

The author directs attention to the difficulty in making an early diagnosis of cancer of the stomach.

He emphasizes the fact that even surgical exploration and gastroscopy may not be of early diagnostic value. He states that since it is frequently impossible to determine accurately that a gastric lesion is malignant even when the specimen has been removed, the determination of early malignancy by simple exploration and examination of the stomach at the operating table is impossible. In this respect the author disagrees with Finsterer and states that when it is possible to determine gastric malignancy during exploratory laparotomy, the diagnosis can no longer be considered early. He says that similar conditions apply to the biopsy of lymph nodes during exploratory laparotomy. If histological examination reveals no evidence of malignancy, it does not necessarily indicate that the gastric lesion is benign, and if histological examination reveals a neoplastic lesion it simply means that the diagnosis has been made too late to cure the patient in the true sense of the word and surgical intervention usually serves only to prolong life.

The author is inclined to the opinion that gastroscopy has not been of great value as an aid in the early diagnosis of gastric carcinoma. He states that the lesion is not infrequently located in a portion of the stomach not readily accessible to gastroscopic visualization and directs attention to the fact that since it is frequently not possible to determine an early malignancy when the specimen has actually been removed, obviously simply looking at the lesion through a tube would not facilitate this.

He then considers the diagnostic significance of certain laboratory procedures. Whereas some still maintain that achlorhydria is a characteristic feature of gastric cancer, the author emphasizes the fact that it cannot be considered of value in the early diagnosis. He quotes the experience of others which shows that achlorhydria may occur in the absence of malignancy and that it is much more frequently present in the late stages of malignancy.

In the clinical considerations of the early diagnosis of gastric malignancy, the author states that distinction should be made between an ulcerating cancer and a transformed ulcer. By the former is meant a malignant lesion which is ulcerative in character, and by the latter a benign ulcer which has undergone neoplastic change. Their distinction clinically is based upon their evolution and development and upon the fact that the benign lesion has frequently changing clinical as well as roentgenological manifestations, whereas the malignant lesion is more constant and progressive in character.

In considering the diagnostic value of the therapeutic tests he states that the patient is placed on some form of conservative therapy for approximately one month. The clinical and roentgenological manifestations of benign lesions gradually subside and frequently disappear. On the other hand, in the malignant lesion the clinical manifestations may subside, but the roentgenological evidence of the lesion usually remains or becomes more extensive. The objection raised to this test is that it sub-

ject the patient with a possible malignant lesion to a delay of a month or month and a half before the malignancy is attacked.

The author next considers the difficulties in interpreting the roentgenological evidence of an early malignant lesion of the stomach. He discusses the three anatomicroentgenological forms (1) the infiltrating with rigidity as its roentgenographic expression (2) the ulcerous form which is expressed roentgenographically by the appearance of a cavity, and (3) the vegetative form expressed roentgenographically by defects in the wall. In considering the various roentgenological features of these different types of gastric malignancies he emphasizes the difficulties in interpreting whether the lesion is benign or malignant especially in the early stages.

According to the author there are even some differences of opinion and some confusion regarding the gross and microscopic characteristics of early gastric malignancy. He refers to report in the literature which have shown that even among eminent pathologists a diversity of opinion exists regarding the characteristic features of certain early gastric lesions. He emphasizes the importance of making numerous sections of a lesion for microscopic study in order to determine the development of an early malignancy.

MICHAEL DEBAKEY M D

Parker E F The Late Result In Acute Perforated Peptic Ulcer Treated by Simple Suture Surgery 1941 49

From 1911 through 1938 there were admitted to the Roper Hospital in Charleston South Carolina 5 patients with acute perforated peptic ulcer who were treated by immediate operation. Of these 5 survived and 27 died a mortality rate of 5 percent. In 18 of the 25 cases of survival the author has been able to obtain satisfactory follow up studies. In all 18 cases the treatment was immediate operation with simple suture. However it is to be noted that in 5 of the 18 cases other procedures (chiefly curettage) were performed in addition to simple suture. In this series there were no cases treated by excision of the ulcer plus pyloroplasty by simple suture plus gastroenterostomy or by primary partial gastrectomy.

Six (33 per cent) of the patients remained well and 12 (67 per cent) did not. The former were subjected to secondary operations because of subsequent perforation.

The late results in relation to age duration of symptoms diet and other factors were studied but no significant findings were observed.

The late results reported in the literature for treatment by simple suture suture plus gastroenterostomy excision plus pyloroplasty and primary gastric resection are reviewed.

It was apparent that all of the late results of treatment of acute perforated peptic ulcer were poor except those following primary gastric resection. Approximately 50 per cent of the patients treated by simple suture will not remain well and an appreciable

number will require some subsequent operation. The late results of suture plus gastroenterostomy and of excision plus pyloroplasty were more favorable but the reason for this is not clear. The most likely reason would seem to be the existence of multiple peptic ulcers in an appreciable percentage of the patient presenting the disease of peptic ulcer.

The incidence of multiple peptic ulcers and/or scars in the surgical pathological material was found to be 27 per cent (4 of 15 cases) and in the autopsy material 36 per cent (16 in 44 cases).

The late result of other types of treatment than that of simple suture were reported as being better and as one would expect those following primary gastric resection were the best. However even in view of the various considerations for and against the different types of operation the primary consideration is the survival of the patient. One can hardly deny that simple suture is the easiest quickest and safest procedure and affords the patient the best possible chance of immediate recovery at any stage following perforation.

However the most important consideration as a result of this study is the fact that the patients should be carefully examined at frequent intervals over a long period of time possibly five years because a large percentage do not remain well. In the event of subsequent complete pyloric obstruction without ulcer gastroenterostomy is known to be highly successful and in the event of persistence or recurrence of the symptoms in view of the large percentage of patients with multiple ulcer secondary gastric resection is to be recommended.

JOSEPH K. NARAT M D

Mantovani G The Diagnosis of Chronic Gastric Duodenal Ulcers Based on 1000 Radical Gastric Resections 1946 53

Of 1178 patients with suspected peptic ulcers the condition was found in only 1017. In 161 instances some other surgical condition indicated a laparotomy and in 8 of the 1017 per cent ulcers of the stomach or duodenum were found.

Peptic ulcers should be expected if pains are related to food intake and if vomiting occurring at the height of the pain stops it.

A callous ulcer is suspected if the condition is of long duration if it shows lucid interval and if conservative treatment gives no results.

The main objective symptoms of peptic ulcer are a circumscribed sensitive zone in the epigastrium and loss of weight. Headache zones are of minor importance. Acidity of the gastric juices rising in the form of a curve and also only slight differences between the total acidity and the free hydrochloric acid are characteristic while a total increase of the hydrochloric acid and also a relative lymphocytosis in the blood are of minor diagnostic importance.

The roentgenological diagnosis of ulcer was found to be correct in only one third of the operative cases. An exploratory laparotomy should be performed more frequently than is the custom in cases in which

the diagnosis cannot be definitely established. If an inspection of the stomach does not establish a definite diagnosis, a gastrotomy should be performed.

JOSEPH K. NARAT, M.D.

Chiasserini, A. Radical Intervention for Duodenal Tumor (Interventi radicali per tumori del duodeno) *Polidini*, Rome, 1941, 48 sez. prat. 649

The relative infrequency of surgical intervention for duodenal or periduodenal tumors is indicated by the fact that Kafka was able to collect only 115 cases from the literature in 1939. Within a period of two months the author operated upon 2 cases of malignant neoplasm of the duodenum: a sarcoma of the second part with voluminous metastasis in the regional lymphatic glands, and an epithelioma of the papilla of Vater which for about six months had caused a complete or almost complete biliary stasis. Both operations were performed in one stage and consisted in resection of the first and second parts of the duodenum, and the implantation of the head of the pancreas in the third part after previous catheterization of the common bile duct and the pancreatic duct with rubber tubes. The operation was terminated by closure of the antral region and gastro-enterostomy. One patient was discharged from the hospital one and one-half months post-operatively but the other patient died on the third postoperative day of bilateral bronchopneumonia. However, at autopsy, there was perfect retention of the duodenopancreatic sutures and complete absence of any spilling or necrosis.

Primary sarcoma of the duodenum is a rare disease. The diagnosis is based chiefly on roentgenography, which shows infiltration of the duodenal wall and a filling defect. It is important to interpret the shadow with care because there may be variations from the normal. The success of surgical treatment depends on early intervention. Although the operative mortality is apparently much higher than statistics indicate (about 36.5 per cent), the author points out that the operation is not always fatal. Operative results are not excellent inasmuch as many who survive operation either die within a few months or show signs of metastasis.

Surgeons have been hesitant to attack malignant lesions of the ampulla of Vater, according to Whipple, Parsons, and Mullins, for two reasons: the belief that the pancreatic juice is essential to life, and the fact that the operation has usually been performed in one stage on greatly debilitated patients.

The value of the injection of trypsin before duodenopancreatectomy has been shown by Kafka to reduce the mortality considerably.

Excision of the papilla is adequate for very small tumors. For larger duodenal malignant growths, resection of the duodenum at the site of the tumor or even duodenopancreatectomy, if necessary, is the desirable procedure, despite the fact that excision has been employed five times more often according to reports in the literature. The two stage operation

is preferable particularly in patients who are debilitated or have biliary retention. The patient should be prepared pre-operatively by the intravenous administration of fluids and blood to build up the general condition. The operation can be performed under local anesthesia.

MICHAEL D. BAKEY, M.D.

Varco, R. L., Hay, L. J., and Stevens, B. The Value of the Local Implantation of Crystalline Sulfanilamide About Gastro-Intestinal Anastomoses in Dogs *Surgery*, 1941, 9, 863

More than 250 operations were performed upon the gastro-intestinal tracts of dogs during the past two years in the Experimental Laboratory, Department of Surgery, University of Minnesota. Despite the employment of a method of closed gastrojejunal anastomosis, the mortality in the dog was surprisingly high. Intestinal surgery in the dog is more difficult because the bowel lumen is smaller, and the gut wall thicker and more friable. Attempts at avoiding leakage by broad approximation of a cuff about an anastomosis readily lead to stenosis or obliteration of the lumen by the diaphragm produced. The importance of these factors is pyramided by the relatively decreased resistance of dogs to peritoneal insults.

Frequently dogs succumbed to a generalized peritonitis in from thirty-six to forty-eight hours after the establishment of what appeared to be a very satisfactory anastomosis. Chemotherapy appeared to offer a means of thwarting bacterial contamination at the suture line. Accordingly, 500 c.c. of an isotonic solution of 0.8 per cent sulfanilamide were given subcutaneously every eight hours to 4 dogs following operation. Three of these animals died of general peritonitis and therefore it appeared that this method apparently gave but slight protection. However, the local implantation of crystalline sulfanilamide about the suture line gave striking protection. A series of 37 operations were performed on dogs without a death from peritonitis. At the close of the operations, the crystalline sulfanilamide was dusted liberally about the anastomosis, the total amount not exceeding 5 gm. Adequate parenteral fluid in the form of normal saline solution was administered for the following three postoperative days.

In a series of 37 dogs operated upon for various gastro-intestinal procedures, with the local implantation of crystalline sulfanilamide (5 gm. or less) about all suture lines, there were no deaths from peritonitis. There were 2 deaths from pneumonia and 1 from gastro-enteritis on the fourteenth day. At post-mortem examination an unusually heavy deposit of fibrin sealed the serosal surfaces at every suture line. Elsewhere the peritoneum was smooth and glistening. With such a mechanism for inhibiting bacterial growth locally, normal postoperative healing promptly took place. In the dog the operation of end-to-end anastomosis of the esophagus carries an average mortality of 20 per cent in expert hands. Three such operations were performed in dogs at the

level of the cervical esophagus and 2 anastomoses were completed at the end of the esophagus to the duodenum without a failure or death. In all these operations crystalline sulfanilamide was powdered about the suture line.

The values obtained for blood sulfanilamide following local implantation of the crystals abdominally are lower than those obtained following subcutaneous administration of a similar amount in an isotonic solution. Blood levels for sulfanilamide appear to be less important for the production of local bacteriostasis than the actual concentration of the drug at the site of contamination. In case of local implantation this value probably approximates the solubility of the drug in tissue fluid which is fifty times that at the ordinary blood level.

In instances of colonic resection in the human being with primary anastomosis usually 2 to 3 gm. of the drug are implanted about the suture line and an additional 1 gm. is distributed over the wound edges of the abdominal wall. The use of the drug has been limited to those cases of gastric resection with perforation into the head of the pancreas or rupture of the viscera.

The efficacy of implanting crystalline sulfanilamide about colonic anastomoses in man on the indications stated has been difficult to evaluate.

Experimentally the local implantation of the crystalline sulfanilamide about gastro-intestinal suture lines in dogs appears to promote healing by inducing local bacteriostasis and the inhibition of fibrinolysis. This mechanism is a definite aid in preventing peritonitis. Clinical evaluation of its worth requires additional trial. JOHN W. NEZUM, M.D.

Adler, H. F., Atkinson, A. J. and Iry, A. C. A Study of the Motility of the Human Colon: An Explanation of Dyssynergia of the Colon or of the Unstable Colon. *Am J Dig & Dis* 94: 8, 1947.

Seventy experiments were performed on 4 male colostomized patients to study the motility of the human colon. As in the canine colon there are 3 types of motility apparent in the human colon. Type I contractions consist of rather rapid rhythmic contractions and relaxations which may occur in the presence of low tone or high tone. These contractions occur in an exaggerated form in the dog after the administration of morphine. Type II contractions are slower rhythmic contractions of large amplitude on which are superimposed more rapid Type I contractions. Type III contractions consist of tonus changes or a tonus wave usually surmounted by Type II contractions of varying amplitude. The larger contractions are probably the result of a summation of the more simple types.

Quantitatively the same types of motility are manifested in the human colon as in the canine colon. It was found that Type I contractions of various amplitude at the rate of 3 to 8 per minute may occur on either high or low tone but usually on low tone. Type II contractions constitute the most

frequent type of motility observed. They are propulsive only when large in amplitude and in phase or when co-ordinated with the activity of the distal segments of the colon. A low amplitude Type II wave may be propulsive if the contents are liquid. The Type III tonus wave or change is usually less than twelve minutes in duration.

The motility of 2 adjacent segments is not always co-ordinated so that propulsive activity in one segment is propagated to an adjacent distal segment and causes transport of the contents. If the distal segment does not respond by accepting the propagated wave a mild cramp-like sensation may be felt. The authors believe that this segmental behavior provides an explanation for the unstable irritable or atonic colon which produces symptoms in the absence of definite roentgenological evidence of localized spasticity of a segment.

The ratio between total motility and propulsive motility is quite constant in different subjects while the quality and quantity of motility is subject to variation in the same and different subjects.

It is believed though not proved that the size of a meal and the presence of contents in the colon condition on the response to the so-called 'feeding' or gastrocolic reflex. Sleep tends to depress and awakening to augment the motility of the colon. If motility is present during sleep it tends to be of the segmentally co-ordinated Type III pattern.

HAROLD LAURMAN, M.D.

Eisman, K. A. and Ferguson, L. K. An Appraisal of the Medical Versus the Surgical Treatment of Idiopathic Ulcerati Colitis. Follow Up Data on 50 Cases. *Am J Med Sci* 94: 202, 1947.

Ulcerative colitis presents a number of fundamental problems still unsolved. The wide variety of therapeutic measures now employed in this disease and the frequency of unsatisfactory results attest to the present deficiencies in our knowledge. Opinion is divided on the question of the specific bacterial nature of the disease. The second division of opinion concerns the place of surgery in treatment of the disease. Those who have had less favorable results with medical treatment employ ileostomy and analogous procedures in as high as 65 per cent of such patients.

The present study was made to determine whether medical treatment alone was superior to combined medical and surgical therapy in a group of patients with ulcerative colitis observed during the past twelve years in the University of Pennsylvania Hospital. In the first group of 23 patients all treated by medical measures only. A second group of 7 were first treated by the usual medical measures and subsequently by one of various surgical procedures.

The results in the opinion of the authors clearly indicate the superiority of surgical treatment in cases of severe ulcerative colitis. The mortality in the two groups was practically equal. Comparison of the subsequent developments led to the conclusion

that those who were operated upon were more nearly restored to normal health than those who were not. The medically treated group has had continued or intermittent manifestations of the disease and is in poor or only fair health. Those operated upon made, in most instances, dramatic recoveries. The great majority have led a normal life. The surgical procedure of choice is a preliminary ileostomy with subsequent colectomy in stages, if the indications exist. The close co-operation of both internist and surgeon is essential for the best results.

JOHN W. NUZUM, M.D.

Boyce, F. F. Acute Appendicitis in Middle and Late Life. An Analysis of 421 Cases in Individuals Over Thirty-Nine Years of Age. *Am J Digest Dis*, 1941, 8: 223.

Of 4,207 patients with acute appendicitis treated at Charity Hospital of Louisiana at New Orleans, 421, or 10 per cent were individuals over thirty-nine years of age. These 421 cases, however, provided 27.5 per cent of the total mortalities.

Acute appendicitis in the aged is a special disease. Its high mortality rate is due in part to the special pathological changes which occur, and in part to the confusing clinical picture frequently manifested.

The pathological changes in a young individual with acute appendicitis are predominantly those of infection and suppuration with a tendency toward localization. In an aged individual the changes are more apt to be on a vascular basis with circulatory impairment, early gangrene, and less tendency toward localization.

The so-called classical picture of acute appendicitis is often absent in middle and late life. The symptoms and signs are atypical. The disease is frequently insidious rather than sudden in onset. Pain is often mild and slightly annoying and it localizes slowly. Nausea and vomiting may be absent. There is often no fever or tachycardia. Characteristic physical findings are notoriously absent. In addition, the symptoms are apt to be complicated by associated cardiac, pulmonary, or renal disease.

An analysis of the mortality rates in this study indicates that old people with appendicitis complicated by perforation or peritonitis tolerate surgery better than conservative therapy. Aged patients are likely to contract pulmonary complications, they do not tolerate toxemia well, and the presence of cardiac and renal disease often prohibits the maintenance of a proper fluid balance. However, surgical treatment should be minimal. The appendix should be removed only if this can be accomplished without additional trauma. Otherwise only drainage should be attempted.

EDWARD W. GRUBS, M.D.

Druzhilnaya, E. D. Pathologico-Anatomical Changes in Adjoining Organs and Tissues in Acute Appendicitis. *Vestnik khir*, 1941, 61: 59.

The author studied microscopically and macroscopically the following tissues and organs adjoining

the appendix: the mesentery of the appendix, the omentum, the parietal and visceral peritoneum, the appendices epiploicae, the lymph nodes of the ileocecal junction, the cecum, the ileum, the female adnexa, the muscles, and the aponeurosis of the anterior abdominal wall. The specimens were obtained in the course of operations for acute appendicitis or at autopsy. In addition, a bacteriological study of the peritoneal exudate was made. The tissues were obtained from 100 patients and 2 cadavers.

The mesentery was involved in the inflammatory process in each instance. According to the intensity of the inflammatory process, changes in the omentum accompanying acute appendicitis may be divided into four stages: (a) appendico-omentitis incipiens, (b) appendico-omentitis phlegmonosa, (c) appendico-omentitis necrotica, and (d) omento-appendicitis, in which the inflammation is more pronounced in the omentum than in the appendix.

Phlegmonous appendicitis was always accompanied by definite changes in the peritoneum in the form of congestion of the blood vessels, leucocytosis within them, and the accumulation of neutrophil leucocytes in surrounding tissues. In catarrhal appendicitis no definite changes in the muscles of the abdominal wall could be demonstrated; phlegmonous and perforative appendicitis were found to produce edema of the muscle fibers, dilatation of the blood vessels, and round-cell infiltration. Probably the close contact between the primary focus of infection in the appendix and the parietal peritoneum facilitates the entry of micro-organisms or their toxins into the abdominal wall. Myositis causes the clinical symptoms of spontaneous pains, pain on palpation, muscular rigidity, and reflex contractions. These symptoms are usually ascribed to an irritation of the peritoneum but are in reality caused by pathological changes in the muscles as well as in the peritoneum.

The aponeurosis of the anterior abdominal wall was examined in 24 cases and in none of them could inflammatory changes be demonstrated.

Although catarrhal appendicitis does not spread to the cecum, phlegmonous processes were found to involve the cecum in 48 of 55 cases.

Inflammatory signs may also be detected in the cecum in the course of perforative appendicitis.

An enlargement of the ileocecal lymph glands was found in only 3 of 102 cases, but upon microscopic examination many more showed a diffuse hyperplasia, lymphoid tissue, indistinct contours of the follicles, dilatation of the lymph vessels, and the accumulation of lymphocytes.

Definite relations could be established between the pathologico-anatomical changes and the bacterial flora of the peritoneal exudate. In catarrhal appendicitis pathogenic micro-organisms were found only rarely. In the phlegmonous form the exudate frequently contained the streptococcus, the enterococcus, the bacillus coli, and the bacillus perfringens.

If the exudate contained the streptococcus and also the bacillus coli: a thrombosis of the blood vessels of the appendix and its mesentery was nearly always found. If the exudate contained the bacillus coli the staphylococcus the enterococcus or the bacillus subtilis phlegmonous appendicitis was frequently accompanied by omentitis mesenteriolitis typhilitis ileitis and an incipient inflammatory process in the anterior abdominal wall.

The author concludes from his investigations that the mesentery of the appendix should be ligated very gently to avoid an embolism. Inasmuch as the formation participates most frequently in the inflammatory process affecting the appendix it should be removed and the stump of the mesentery should not be attached to the site of the purse string suture because pathogenic bacteria may remain there in a dormant stage for a long time.

In the third stage of changes in the omentum devitalized areas should be removed.

In grave destructive perforating appendicitis drains should be inserted into the peritoneal cavity for from one to two days because in such cases the peritoneum is usually involved in the process.

JOS. PH. K. N. RAT. M.D.

LIVER, GALL BLADDER, PANCREAS AND SPLEEN

Fagerberg E. Fagerberg S. E. and Fahraus R.
Hyperemic Splenomegaly Increased Hemolysis
Increase of Fibrinogen and Accelerated
Sedimentation of the Red Cells (La splénomé-
galie hyperémique l'hémolyse accélérée aug-
mentatió fibrinogé et l'sédimentation a-
cclérée des globules rouges). *Acta med. Scand.*
194 8.

The authors report experiments on rabbits showing that when hemolysis is produced by the intra-venous injection of distilled water lysolecithin or red cells of the same species the plasma fibrinogen increases proportionately with the destruction of the red cells. Recent studies of the function of the spleen by Knisely and by one of the authors (Fahraeus) have shown that the spleen separates the red cells from the plasma and therefore has a hemolytic function as well as serves as a reservoir of the red cells. When enlargement of the spleen due to congestion occurs hemolysis increases and with increasing hemolysis the plasma fibrinogen increases. Other experiments have shown that acceleration of the sedimentation of the red cells is related to increased plasma fibrinogen. Thus there is a close relation between congestive splenomegaly increased hemolysis increased plasma fibrinogen and accelerated sedimentation of the red cell.

This is shown in two physiological states associated with splenomegaly due to congestion—pregnancy and the neonatal period. In women and in some laboratory animals there is considerable enlargement of the spleen due to hyperemia during pregnancy. Pregnant women show evidence of in-

creased hemolysis (bilirubinemia reticulocytosis) and a tendency to anemia. Various investigators have demonstrated an increased plasma fibrinogen and acceleration of the sedimentation rate during pregnancy. An enlarged spleen is often palpable in the newborn infant from the second to the fifth day in this period there is a definite fall in the red cell count the rapid hemolysis at this time is one of the causes of jaundice of the newborn. The plasma fibrinogen increases rapidly in the first week of life and the red cell sedimentation becomes more rapid.

The same association of congestive splenomegaly increased hemolysis increased plasma fibrinogen and accelerated red cell sedimentation is also demonstrable in many infectious diseases that characteristically show a considerable enlargement of the spleen.

Alice M. Meyers

Berman C. The Pathology of Primary Carcinoma of the Liver in the Bantu Races of South Africa. *S. Afr. J. Med. Sc.* 1941 6 1.

Primary carcinoma of the liver the rarest form of malignancy affecting Europeans is very common among most pigmented races. Moreover in the Bantu it is by far the most frequent type of carcinoma as at the Witwatersrand Gold Mines it was responsible for 90 per cent of all cancers.

No comprehensive pathology of primary carcinoma of the liver has appeared in recent South African literature and by virtue of its extreme rarity amongst white skinned races the pathology of primary liver cancer as found in standard European or American text books of Medicine and Pathology is neither satisfactory nor adequate.

The gross pathology of 54 Bantu cases of primary carcinoma of the liver is described. The average weight of 42 carcinomatous livers was 3925 gm the maximum weight was 7100 gm and the minimum 1900 gm.

In 34 cases both lobes of the liver were involved in 19 cases the right lobe alone was involved and in 1 case the left lobe only was affected.

Macroscopically the tumors are classified into 2 groups—34 nodular cancers and 20 massive cancers. The main features characterizing each group are illustrated and described.

The microscopic structure observed in 25 cases is described and illustrated. These cases have been classified into 4 hepatocellular cancers and cholangiocellular cancer.

In the hepatocellular carcinomas the malignant cells were grouped according to a definite histological pattern of compact columns which either anastomosed with each other or terminated freely as rounded cell masses. The stroma was composed of only a closely fitting network of capillaries. The tumor cells were large and polygonal in shape with granular cytoplasm. The nuclei which contained multiple nucleoli were most strikingly mitotic figures were numerous and giant cells were frequent. Biligmentation was often found. Central degeneration of the cell column and fibrotic changes were common.

One case of cholangiocellular carcinoma is described. Histologically, the tumor consisted of nodular cystic masses composed of closely-packed, delicate, tall, slender, villous structures. The stroma was fibrous. The tumor cells were of tall columnar shape, the cytoplasm was pale, the oval nuclei rarely showed evidence of mitosis, giant cells were absent, and bile staining was not visible. There was a marked increase in the number of newly-formed bile ducts in the remaining tissue.

Cirrhosis of the liver was always present.

Metastasis was frequent, both intrahepatic and extrahepatic. Thirty-one of 54 cases (57.4 per cent) showed secondary deposits outside of the liver. The total number of metastases was 76. Of all organs, the lungs were the most readily involved. There were 27 cases with lung involvement in 25 of which both lungs were affected. Next most often involved were the regional lymph glands (8 cases). Other organs affected were the pancreas, diaphragm, omentum, gall bladder, mesentery, peritoneum, pleura, heart, ribs, sternum, and brain. Bile pigment was often found in distant metastases. The literature concerning metastasis is reviewed.

On macroscopic and microscopic bases, further evidence is presented to support the view that primary carcinoma of the liver is unicentric in origin.

SAMUEL H. KLEIN, M.D.

Snell, A. M., and Comfort, M. W. The Incidence and Diagnosis of Pancreatic Lithiasis. A Review of 18 Cases. *Am J Digest Dis*, 1941, 8: 237.

The authors remarked that they wished to correct the impression that pancreatic stones are excessively rare, and seldom discovered except by accident. They also called attention to certain features of the symptomatology which may lead to more frequent diagnosis, and, finally, they cited certain complications of pancreatic stone which are of themselves important and which in some cases may be sufficient to mask completely the clinical picture produced by the stones themselves.

Stones have been found at the Mayo Clinic with increasing frequency in recent years, probably because clinicians and surgeons have been on the lookout for them. In 1921 Sistrunk reported 4 instances of pancreatic lithiasis encountered surgically, and Hartman, four years later, reported 4 additional cases. J. G. Mayo examined the Clinic's records for the period from 1925 to 1936 and found 18 cases, of which 9 were found at necropsy, 7 at operation, and 2 were diagnosed clinically but not proved. In his report he mentioned several doubtful cases but discarded them because the clinical information was not sufficient to make a positive diagnosis. The authors reported 3 cases of pancreatic lithiasis in 1937, with particular reference to fatty metamorphosis of the liver, this in turn being incidental to the development of pancreatic atrophy. From January 1, 1937 to November 30, 1940, inclusive, 18 additional cases were encountered at the Clinic, these formed the basis for the authors' report.

The chemistry of formation of pancreatic stone is not fully understood. However, two facts stand out: (1) pancreatic stones are chiefly composed of calcium carbonate and tribasic calcium phosphate, and (2) since the normal pancreatic juice does not contain calcium in this form it is probable that inflammatory processes in the pancreas are responsible for alteration of the chemical composition of pancreatic secretions and the subsequent deposition of calcium within the ducts. Perhaps some chemical process similar to that leading to the formation of "Kalkmilchgalle" is operative. In many cases on record there is a history of previous attacks of pancreatitis, stasis and obstruction to flow of pancreatic secretion thus produced doubtless lead to the formation of stone. Minute foci of calcification may also be seen in the parenchyma of a pancreas which has been the site of a previous inflammatory reaction.

How long a time is required for the formation of intraductal deposits of calcium cannot be definitely stated.

Stones may be present in the ducts of Wirsung and in the ducts of Santorini, but they appear to be much more common in the former location. The presence of stone in the major pancreatic ducts leads to obstruction to the flow of pancreatic secretion with subsequent atrophy of the acinar structure of the gland. The main ducts may become dilated to a point which gives the gland the appearance of a large stone-containing cyst. There is often an inflammatory reaction in the adjacent tissue, which may be subacute or chronic. The process of destruction of the acinar tissue is most often slow, since in many instances of the disease it is possible to show by appropriate studies that the pancreas retains some of its normal secretory capacity even at a late date after the development of symptoms.

Formation of cysts is not particularly uncommon and the smaller pancreatic ducts may be dilated to a considerable size. Abscesses of varying size in the pancreatic tissue are sometimes seen.

A clear-cut clinical picture of pancreatic lithiasis is lacking, but this statement does not seem to apply to pancreatic calculi to a much greater extent than it does to biliary or renal stones. The clinical picture is admittedly variable and depends in a general sense on how much damage has been done to the pancreas and to other organs, and on the amount of reflex digestive disturbance produced. As is the case with stones elsewhere in the body, the condition may be almost or entirely asymptomatic.

The most common clinical symptom is pain, this may range from colic of great severity to a somewhat milder and more transitory type of distress. Severe colicky pain has been noted in about two-thirds of the reported cases. The pain, which is usually centered in the epigastrium, resembles biliary colic in its general character and distribution. The colic of pancreatic stone may be associated, however, with left-sided extension and such pain may be further projected into the left costovertebral angle. It may also extend posteriorly into the midthoracic region.

These colics may be excruciatingly severe and may require repeat doses of morphine sulfate for relief. The pain may be accompanied by nausea and vomiting. Because of the location of the pain it is quite natural that in many instances it has been attributed to some lesion of the biliary tract.

The colics mentioned in the preceding paragraph should not be confused with episodes of acute pancreatic necrosis which have often been described in connection with pancreatic stone and which were present in at least 3 of the authors' cases. These attacks of acute pancreatitis are in every way comparable to those which develop without the presence of calculi and may be associated with the usual clinical features of sharp intense pain in the upper part of the abdomen, nausea, vomiting and collapse.

In many of the authors' cases there was a history of profound reflex disturbance in the motor and secretory functions of the digestive tract. Pyloric spasm or gastroparesis with or without secretory disturbances appears to be common. Many of the patients had episodes of nausea and vomiting which are not necessarily associated with pain. Such episodes may follow an episode of colic; however, and it is often possible to demonstrate gastric retention and hypersecretion at these times.

Perhaps the second commonest clinical feature of pancreatic stone is steatorrhea which is present at one time or another in about a half of all cases. The fat losses may be large and usually result in considerable loss of weight. There are, however, certain cases on record in which steatorrhea has persisted for years with relatively little harm to the patient. Steatorrhea has been reported especially after a meat meal. It is important to note that neither the steatorrhea nor the creatorrhea may be a constant feature of the disease in the individual case. Some times episodes of this sort are present only following colic as described previously and not at other times. Loss of weight is in a general way parallel to the degree of disturbance of intestinal function particularly to the degree of steatorrhea present.

Diabetes mellitus is present in a considerable number of cases, especially if the stones are of long standing. In most of the reported cases the lithiasis has been discovered at a very late date and it is natural that the reported incidence of diabetes in the literature should be relatively high. In many cases latent diabetes can be demonstrated that is a positive reaction to glucose tolerance tests can be obtained although the patient does not necessarily exhibit glycosuria or hyperglycemia at the time of examination. In the present series of 18 cases there were 8 examples of true or latent diabetes.

The development of jaundice in the authors' experience was relatively uncommon. The authors have not as yet encountered any patient who has passed stone by bowel.

The most characteristic sign of the disease and one on which diagnosis most often depends is roentgenological evidence of stone. The shadows are usually dense, multiple and grouped and may be

seen on either or both sides of the vertebral column in roentgenograms taken in the anteroposterior position. They are best visualized in an oblique roentgenogram and may often be missed in ordinary roentgenograms of the kidneys, ureters and bladder or in colocolostograms. Stones are often seen lying along an axis which corresponds roughly to the position of the pancreas; they are usually confined to an area bounded above by the upper level of the first lumbar vertebra and below by the lower border of the third lumbar vertebra. Shadows of stones have a typical consistency; they are dense and very sharply outlined. The authors noted that Gillies had mentioned 4 types of roentgenographic shadows: (1) multiple irregular calculi which are the most common; (2) single calculi which are rare; (3) multiple faceted calculi resembling gall stones which are decidedly uncommon; and (4) large fragmented stones which form a virtual cast of the pancreatic ducts.

The second group of diagnostic signs depends on the development of pancreatic insufficiency in respect to the external secretion of the organ. From the clinical standpoint this is best gauged by the degree of steatorrhea present. The erum lipase and amylase may not be much disturbed although positive data can be expected after an attack of colic with or without pancreatitis. It is necessary of course that a sufficient amount of function of gastric tissue remains to produce the ferments in question.

Diagnosis is not particularly difficult provided one keeps the possibility of the disease in mind. The history, the physical and laboratory findings and particularly the roentgenological examination of the pancreatic area should be sufficiently typical to establish positive diagnostic criteria. The authors believed that roentgenograms of the pancreatic area should be made particularly for patients who present (1) obscure attacks of abdominal pain or gastro-intestinal storms of uncertain origin; (2) diarrhea with fatty stools; (3) unexplained enlargement of the liver with or without ascites; (4) diabetes particularly if it be associated with such abdominal symptoms as colic or diarrhea; or (5) jaundice of intermittent origin. The roentgenological picture is itself quite characteristic and in most instances should suffice to make the diagnosis. It should be emphasized again that pancreatic lithiasis is not well demonstrated in ordinary roentgenograms of the kidneys, ureters and bladder or in routine colocolostogram. For some unexplained reason the stones are said to be difficult to visualize roentgenographically. Barium in the intestinal tract may also obscure the clinical picture. In case of doubt the location of the stones is made out accurately by roentgenograms taken with the duodenal tube in situ.

Among the sources of roentgenologic error may be mentioned one in the common duct calcified mesenteric nodes or calcified nodes in the vicinity of the cystic duct calcareous patches in the splenic artery have also been confused with pancreatic stone.

It is the practice of surgeons at the Mayo Clinic to examine the pancreas carefully and to inspect any

hard nodules with particular care. If this were more generally done it is certain that many more stones would be found at operation.

The use of pancreatic functional tests has not as yet reached the stage of general availability which makes them particularly helpful in diagnosis. If these were more generally used it is certain that many more persons who have pancreatic insufficiency would be identified and given more adequate study.

The obvious treatment is, of course, surgical. Many of the patients who were cited in the authors' report were seen at a time when they were beyond the reach of surgical aid. Some of them had so much local inflammation in the vicinity of the pancreas, or the organ itself was so completely destroyed that only exploration was done. A few successful operations have been performed at the Clinic and the authors' surgical colleagues anticipate greater successes in subsequent cases provided earlier diagnosis can be made. Relatively little trouble is produced by postoperative pancreatic fistula or by reactivation of pre-existing pancreatitis. Peritonitis appears to be rare. In short, if diagnosis can be made at a somewhat more favorable time it should be possible to perform curative surgical procedures in a substantial percentage of cases.

Many suggestions have been made in regard to palliative treatment of the disease. The use of pancreatin or dried pancreatic juice to correct pancreatic insufficiency has been helpful in the authors' experience. In at least 1 case lipocac had a specific effect on fatty metamorphosis of the liver associated with stone. Attacks of severe colicky pain usually require morphine sulfate for relief but ephedrine may be worth trying, especially since it is known to reduce the volume of pancreatic juice. A low carbohydrate diet has also been recommended, partly because of the requirements of the associated diabetes and partly because of the fact that it appears to diminish pancreatic secretion. In general, palliative treatment is of little value and unless one can remove the stones the patient must be reconciled to a considerable degree of discomfort and to gradual destruction of the remaining portion of the pancreas.

Tejerina Fotheringham, W. Rupture of the Spleen in Two Stages. Spontaneous Rupture (Rupturas del bazo en dos tiempos. Rupturas espontáneas). *Bol y trab Acad argent de cirug*, 1941, 25: 324.

Several types of splenic rupture are described and a typical case report of each is included to illustrate the clinical symptomatology and the pathological findings. In the most common type, the parenchyma and overlying capsule are ruptured spontaneously with an accompanying vasodepressor picture of shock and frequent loss of consciousness which, however, lasts for only a brief interval. This is followed by the formation of a perisplenic hematocele and a period of clinical latency in which the condition of the patient improves and he may even become am-

bulatory for several hours or days. The breakdown of the hematocele and consequent inundation of the peritoneal cavity ushers in the third period which is characterized by profound shock and severe, uncompensated anemia.

In the second type, the parenchyma is ruptured but the capsule remains intact. The initial symptoms are much less severe, pain being prominent but shock or unconsciousness usually being absent. As the subcapsular hematoma forms, there is a period of latency characterized by more or less pain but nothing else notable. This hematoma may be replaced by fibrous tissue or by a cyst, or it may become secondarily infected and form an abscess. However, in many instances it ruptures secondarily through the capsule after several hours or days and inundates the peritoneal cavity, with consequent profound shock and deep, uncompensated anemia. This latter type is the true "two-stage" splenic rupture. It usually follows moderate to severe trauma, the patient reported upon by the author had been pushed against the edge of a table.

On one occasion the author saw this syndrome occur spontaneously without trauma. The patient, a woman thirty years of age who had previously been perfectly well, was awakened from a sound sleep by a severe pain in the left hypochondriac area. This continued without intermission and was accompanied by shock and other signs of intra-abdominal bleeding until operation seventeen hours later. Upon exploration the pelvic organs were found to be normal and the spleen was the sole source of the hemorrhage. Pathological examination revealed a large subcapsular hematoma which had ruptured. The hematoma itself appeared to have originated in numerous small subcapsular fissures in the parenchyma which were of unknown etiology.

FRANK McDOWELL, M.D.

MISCELLANEOUS

Petri, S., Jensemus, H., and Thyssen, E. Experimental Studies on the Production of Pernicious Anemia by Operation on the Digestive Tract. Results of Combined Elective Resection of the Pylorus and the Brunner-Gland Section of the Duodenum and the Distal Two-Thirds of the Small Intestine on Pups. *Acta med Scand*, 1941, 107: 532.

A report is given of the results of combined elective resection of the pylorus, the Brunner-gland area, and the distal two-thirds of the small intestine performed on 3 pups, after thirty-nine, sixty-six, and two hundred and eleven days of observation, respectively.

With the localization and extent of the resected sections of the digestive tract these studies form a sort of animal experiment parallel to Uotila's clinico-therapeutic studies. Nevertheless it has not been practicable here to produce experimentally a regular state of pernicious anemia.

On the other hand, in these animals there developed a morbid condition that was characterized

infection and postulates that this infection ascends by way of the perineural lymphatics and sets up a chronic inflammatory process in the posterior root of the cord similar to a radiculitis. At the present this seems to be the most acceptable explanation of the cause of somatic pain.

The somatic pain is felt in the thigh and leg in the distribution of the lumbosacral plexus. It is unassociated with any visceral lesion and the afferent pathway concerned is the ordinary somatic one. The pain is felt fairly accurately in the distribution of one or more spinal nerves. It is shooting, stabbing or throbbing more or less continuous with exacerbations at night or after movement.

LOCAL MEASURES

Several of the local measures have already been mentioned such as the passage of a sound into the uterus to rule out pyometria. The pain due to bone metastases is frequently relieved by x ray therapy. Rectal bladder and urethral involvement are at times present occasionally with fistula to further complicate the treatment. Pyelitis, pyelonephritis, hydronephrosis and hydro-ureter must also be considered. The importance of this is demonstrated in the case reported in which chordotomy failed to relieve the pain and at autopsy a hydronephrosis was found. Chambers studied the urinary complications of carcinoma of the cervix in 43 consecutive cases with autopsy. Twenty one of the cases received radiation therapy 22 did not. Ureteral obstruction with resulting hydronephrosis developed in 18 or 82 per cent of the untreated cases and in 13 or 62 per cent of the treated cases. Saltzstein, Lauppe and Feldstein have summarized in an excellent article the local measures which may be carried out. They emphasize the importance of treating the exact cause of the discomfort rather than loading the patient with narcotics. The foul smelling discharge from the carcinoma of the cervix may be decreased by the use of dilute hydrogen peroxide instillations or equal parts of charcoal and iodoform. Local measures such as this add to the comfort of the patient and should be kept in mind.

DRUGS

With the first appearance of pain the patient is usually given a mild analgesic such as aspirin and as the severity increases codeine is administered. Later it is usually necessary to prescribe morphine or another of the opium derivatives such as dilaudid or pantopon. It is interesting to note that Hayman and Fox have found that pantopon although twice as costly as morphine is less efficacious. David in a comparative study of

morphine and dilaudid finds the latter to be just as potent but with less tendency to produce nausea and vomiting. Lee has reported preliminary studies on phenanthrene derivatives in the control of pain. He states the most promising of this group is methyl dihydromorphinone.

The disadvantages of the administration of these drugs are the cost, the necessity for sterile hypodermic injection, the mental aberrations produced, the concomitant effects on the other organs such as constipation and nausea and above all the failure in many cases to control the pain short of a state of lethargy.

Behan believes that the pain is due to changes in the metabolism of the cancer tissues so that deleterious products, mainly lactic acid, are formed in great enough concentration to cause the pain stimuli. He therefore administers calcium as this combines with the lactic acid and produces the less soluble calcium lactate. He also thinks the calcium may raise the pain threshold in the peripheral nerves and lower the reception in the higher brain centers. No confirmation of his work is available.

Macht in 1938 and Rutherford in 1939 reported their experiences with cobra venom. Macht believes the venom to act on the higher center in the same way as morphine except that the morphine is rapid in action while the cobra venom is slow and the effect more prolonged. There appears to be no tendency to addiction and the margin of safety is wide. In a preliminary report The Council on Pharmacy and Chemistry of the American Medical Association warns of the disagreeable side effects of nausea, vomiting, diarrhea and pain of injection. Treatment is started with the injection of 2.5 mouse units daily for the first two days, the dosage gradually being increased to from 10 to 20 mouse units daily until control of the pain is secured. Macht has treated 185 cases of intractable pain of which 53 were cases of pelvic carcinoma. He obtained definite relief in 70 per cent, questionable relief in 10 per cent and failure in 20 per cent. Rutherford reports 17 cases of which 10 were cancer of the cervix, ovary or vulva. He obtained complete relief in 46 per cent, slight pain remaining in 24 per cent, partial relief in 16 per cent and slight relief in 12 per cent. Black treated 17 cases predominantly carcinoma of the cervix and found cobra venom effectual in the relief of pain. From the available evidence further study will be necessary prior to any final attempt of evaluation.

RHIZOTOMY AND MYELOTOMY

Dana in 1886 first suggested section of the posterior roots and the first successful American

case was reported by Abbe in 1896 (quoted by Cutler). This operation consists in the cutting of the posterior roots before they enter the spinal cord, and is based on the fact that all sensory impulses are carried through these roots. It has been used less often in recent years because of the frequent failures, the reason for these failures being the extensive overlapping of the pain fibers in the segments. Another disadvantage is that it is an extensive procedure involving laminectomy over a large number of vertebrae if any degree of success is to be expected.

Myelotomy, the complete severance of the spinal cord, has been performed in only 2 reported cases, once by Cushing and once by Leriche. This procedure, with its subsequent complications, is deemed far too radical in the light of the other operative procedures which may be done, and therefore will not be considered further.

SUBARACHNOID ALCOHOL INJECTION

The intraspinal subarachnoid injection of alcohol was first reported by Dogliotti in 1931. He based his treatment on the theories of Lugaro and Leriche. Lugaro (quoted by Dogliotti) believed a simple reduction of the number of sensory nerve fibers was sufficient to stop the passage of pain stimuli. Leriche believed that fibers which carry only pain do not exist, but that pain is carried by the same fibers which transmit heat, cold, and pressure. He further postulated that an excessive stimulus of these nerves produces pain, and if the number of fibers is reduced, painful sensations will not occur. Dogliotti chose the subarachnoid space as this is the most central region in which to attack the roots. As the sensory fibers are smaller and less heavily myelinated, they are more readily injured and dissolved by alcohol. Alcohol is used partly because its specific gravity is considerably less than that of the spinal fluid and so floats to the top for several minutes.

Stern lists 241 different conditions producing intractable pain which may be treated by this method. Most of the reports in the literature, however, are concerned with malignancy. The advantages of this procedure as stated by Dogliotti are: the method is simple and can be carried out in a short time, there is a minimal amount of associated pain, the action is rapid, only the sensory nerves are affected, the block is at the central point, and success is frequent. The disadvantages, despite these assertions, are: several injections are often necessary, success is not as frequent as might be desired, and motor symptoms, including involvement of the rectal and bladder sphincters, do occur.

The procedure is carried out by placing the patient with the painful side uppermost. An attempt is made to have those roots which are most affected, usually the upper lumbar, at the highest point of the curve of the spine, in order that these will be bathed most heavily in the alcohol. Several small pillows placed under the back will help to accomplish this. A lumbar puncture is then made in the routine manner. No spinal fluid is withdrawn. The alcohol is then injected very slowly. Absolute alcohol is used by most authors, 95 per cent by a few. The amount injected is usually from 0.5 to 0.75 c.c. More than this tends to increase the number of complications, as paralysis and urinary retention. It is best to leave the patient in the original position for from twenty to thirty minutes following the injection, then turn him on his back for several hours.

Immediately after the injection there is usually a sharp burning pain in the distribution of the nerves affected. This is followed by numbness, warmth, burning, paresthesia, and analgesia. Weakness of the upper leg may occur. Bladder and rectal sphincter disturbances sometimes are noted, and the urinary retention may last several days and require catheterization. Headache may also be a postoperative complaint. Usually all these complications pass off in a few days but at times they may persist for several weeks or even months. They are due most frequently to the use of an excess amount of alcohol.

TABLE I — THE RESULTS OF SUBARACHNOID ALCOHOL INJECTIONS

| Reported by | Year | Total Cases | Complete Relief | Partial Relief | No Relief |
|-----------------------|------|-------------|-----------------|----------------|-----------|
| Saltzstein | 1934 | 11 | 10 | 0 | 1 |
| Saltzstein | 1938 | 50 | ? | 50* | ? |
| Greenhill and Schmitz | 1935 | 7 | 20 | 3 | 2 |
| Greenhill and Schmitz | 1936 | 40 | 34 | 2 | 4 |
| Dunphy and Alt | 1936 | 13 | 6 | 5 | 2 |
| Todd | 1937 | 18 | 17 | 0 | 1 |
| Meyner | 1936 | 10 | 9 | 0 | 1 |
| Abbott | 1936 | 10 | 8 | 1 | 1 |
| Russell | 1936 | 20 | 16 | 0 | 6 |
| Yeomans | 1933 | 7 | 7 | 0 | 0 |
| Ottley | 1938 | 1 | 1 | 0 | 0 |
| Dogliotti | 1935 | 304 | 179 | 65 | 59 |
| Grant | 1941 | 31 | 15 | 6 | 10 |
| Total | | 494 | 322 | 82 | 87 |
| Per cent | | 100 | 65.1 | 16.6 | 17.6 |

*Not included in total

by inhibition or arrest of growth emaciation changes in the skin and hair together with degenerative changes in the central nervous system (pellagra) and anemia (which in 2 cases was hyperchromic and macrocytic) besides achylia and periodical diarrhea. In the longest observed case the pellagrous changes and the anemia showed spontaneous remission. In addition duodenal ulcer was demonstrated in 2 of the cases.

A comparison is made between the present results and the author's previous experiments with resection of the pylorus and the Brunner gland area only. The particular changes observed in the present experiments may possibly be attributable to the intestinal resection.

The authors present the following reasons for the fact that a regular state of pernicious anemia failed to appear experimentally.

1. The operation does not yet represent that combination of resections of the stomach and gut

which jeopardizes the formation of the antipernicious anemic principle.

2. The extent of the operative measures has not yet been sufficiently large.

3. The prevailing conception concerning the intrinsic factor and thus the way in which the active liver principle is formed is erroneous.

The experimentally produced changes described in this paper are compared by the authors to the group of morbid conditions in man consisting of typical macrocytic anemias sprue and atrophic steatorrhea and infestation with *botrioc phalus latius* in which macrocytic hyperchromic anemia appears together with more or less manifest intestinal disturbances, inconstant changes in the central nervous system and achylia. They also consider the feasibility of identifying this morbid condition with that variation of endogenous pellagra in man in which the accompanying anemia is hyperchromic and macrocytic.

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THE TREATMENT OF PAIN IN CARCINOMA OF THE CERVIX

Collective Review

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FIRSTLY, one should never do anything that is harmful, secondly, early operative intervention is desirable, and the appropriate operative procedure should be adopted at the very onset. These are the first two rules which Leriche believes essential in the surgery of pain.

The majority of cases of terminal cancer are treated in the small hospital, or at home by the family physician. As in years past, morphine remains the agent employed most frequently for the prevention of pain. That other methods of treatment are readily available is well known, but that their use is easily adaptable is not generally appreciated.

The Metropolitan Life Insurance Company reports that among the weekly premium-paying policyholders, over the twenty-five year period from 1911 to 1935, cancer of the female genital organs was responsible for 52,704 deaths, the patients' ages ranging from one to seventy-four. This constituted 20.1 per cent of the mortality from all forms of cancer and comprised 1.7 per cent of the deaths from all causes. Furthermore, cancers of the reproductive organs were responsible for almost one-third of the total deaths from malignant tumors in this sex. In the Federal Report of Mortality Statistics for 1936, 16,280 deaths resulted from cancer of the uterus, including carcinoma of the cervix, which represented 12.7 deaths per 100,000 of the population.

From these figures, some conception is afforded of the frequency of this condition. As nearly every woman who dies of carcinoma of the cervix experiences severe pain at some time during the course of the disease, the importance of the treatment of pain in pelvic malignancy becomes evident. These statistics do not include the many patients with carcinoma of the large bowel, prostate, and bladder, and others in whom the pain experienced is predominantly similar to that of cancer of the cervix.

The following methods may be used to combat the pain: local measures, drugs, rhizotomy, myelotomy, subarachnoid alcohol injection, presacral neurectomy, and chordotomy.

Before any treatment is attempted, a complete survey of the patient must be carried out. The subjective features which must be ascertained concerning the pain are type, severity, situation, duration, frequency, path of reference, special time of occurrence, and aggravating or relieving factors. Objectively, digital examination of the cervix, uterus, and parametrial tissues should be made, including the use of the speculum and the passage of a sound into the uterus to exclude pyometria. Cystoscopy and proctoscopy may be done to determine the extent of local invasion. Roentgenograms are taken for evidence of bone and lung metastases. Neurological examination is carried out for signs of nerve or cord involvement. The importance of this will be seen later, as the selection of the type of treatment depends on the results of these findings.

It is not within the scope of this article to discuss the theories of the cause of pain. Somatic and visceral pain, however, should be differentiated. Visceral pain is due to the lesion in the viscus, but whether it is due to local ischemia, surface irritation, or tension is still the subject of controversy. The visceral pain is limited to the lower abdomen and pelvis. It is typically diffuse, it may be bursting, spasmodic, or occasionally colicky. It tends to be worse after voiding or defecation. The pain feels deep and may at times be "bearing down" in type. Infrequently, it radiates to the thighs. The pathway involved is the sympathetic, the most important fibers of which form the presacral nerves and pass into the inferior hypogastric ganglia.

Somatic pain has been assumed to be caused most frequently by direct invasion of the pelvic nerves or by bone metastases, but from the observations of Todd, this is entirely erroneous. With x-rays, bone metastases can seldom be demonstrated. Todd states that, in his experience, he has never seen gross or microscopic evidence of nerve invasion. Another factor tending to support his view is that many patients with marked local invasion have no pain, whereas others with little or no such invasion have severe pain. He believes that in every case there is a superimposed

Two points must be emphasized in the nature of a warning. First if no clear spinal fluid is obtained the procedure should be discontinued as the alcohol must be injected into the subarachnoid space. Second the head should be kept low to avoid the danger of respiratory paralysis. The results obtained by means of this procedure are noted in Table I.

Subarachnoid injection of alcohol finds its greatest use in the somatic type of pain but also may be successfully employed in the visceral type. In the small hospital and by the general practitioner when the services of a neurosurgeon are not readily available it offers one of the most satisfactory means of therapy. Ampoules of alcohol ready for use are commercially prepared. Only the ordinary equipment for lumbar puncture is necessary. By careful attention to proper procedure maximum effective results may be obtained with a minimum of equipment, time, operative complications and mortality.

PRESACRAL NEURECTOMY

This procedure was first suggested by Jaboulay in 1899 but it received very little attention until the article by Cotte was written in 1925 (quoted by Cutler). The detailed anatomy of this nerve was covered by Elaut in 1932. Todd believes that the failures reported are due to neglect in carefully qualifying the exact type of pain as only the visceral type will be relieved by presacral neurectomy. It is therefore believed that this operation should be carried out only when the pain is definitely visceral in type as explained in the early part of the paper. Leriche and others feel that one advantage of this procedure is that during the operation an exploration of the pelvis can be carried out which may assist in later treatment. The disadvantages are that the patient is being subjected to a laparotomy and that failures frequently occur.

TABLE II — THE RESULTS OF PRESACRAL NEURECTOMY

| R. ported by | % | Total Cases | Complete Relief | Partial Relief | No Relief |
|------------------------|------|-------------|-----------------|----------------|-----------|
| F. ta. d. H. man. | | | | | |
| G. hill. d. Schmitz | | | 3 | | |
| Gre. ah. H. d. Schmitz | 6 | | 5 | | |
| Beh. y. | 93.5 | | 6 | | |
| Todd | 3 | | | | |
| W. h. H. | | | 7 | | |
| Total | | | 8 | | |
| Per cent | | | 7 | 6 | |

Anatomically the fibers arise from the aortic plexus and with communicating branches from the sympathetic trunks course along the lateral margins of the anterior surface of the aorta from the origin of the superior mesenteric artery to the origin of the inferior mesenteric artery. A few anastomoses cross the aorta. At the origin of the inferior mesenteric artery the nerve divides into two bundles. One the inferior mesenteric plexus follows the artery while the other continues down the anterior surface of the aorta as the superior hypogastric plexus or presacral nerve. It is shaped like a triangle with the base inferiorly. At the base the plexus divides into two nerves the right and left hypogastric nerves. These extend into the pelvic cavity where they expand on both sides of the pelvic organs and receive branches from the sacral plexus to form the inferior hypogastric plexuses. These are situated on each side and behind the cervix and supply the uterus. The ovaries, vagina, bladder, rectum and lower part of the ureters are supplied partially from these plexuses.

The main portion of the plexus is found in a triangle bounded as follows: the base corresponds to a line uniting the two common iliac arteries at the level of the sacral promontory and the sides are formed by the two arteries with the bifurcation of the aorta representing the apex.

Briefly the operative procedure is as follows:

After the abdominal cavity is opened the patient is placed in the Trendelenburg position and the intestines and colon are packed upward. The rectosigmoid is retracted laterally to the left and the promontory of the sacrum and the two common iliac arteries are identified. The posterior parietal peritoneum is incised just above the promontory. Immediately beneath the peritoneum and anterior to the midsacral artery will be found the nerve filaments which constitute the presacral nerve. If the mesosigmoid is short care must be taken not to injure the inferior mesenteric vessels. The nerve fibers are then resected at least 1 in. being taken from each nerve fiber in order to prevent regeneration. Closure is then made.

The results of this procedure have been fairly satisfactory in properly selected cases. There were 115 cases found of which 81 (70.4 per cent) were completely relieved, 19 (16.5 per cent) were partially relieved and 15 (13.0 per cent) had no relief.

The exponents of this operation mainly Leriche and his coworkers have had excellent results. Generally however it has lost favor among surgeons in this country principally because of the

failures, both immediate and remote. The pain in carcinoma of the cervix is infrequently entirely visceral in type, and this undoubtedly explains the poor results.

CHORDOTOMY

The anterolateral or spinothalamic tract was first suspected of carrying the pain and temperature fibers by Gowers in 1879 (quoted by Grant). Van Gehuchten in 1895 was fairly positive of this, but it was not until 1904 that definite clinical proof was given by Spiller. He obtained a post-mortem examination on a patient who showed clinically complete loss of pain and temperature in the lower extremities without involvement of the other senses. There were found small tubercles on both sides of the cord involving only the anterolateral tracts. Schuller in 1910 then suggested cutting the sensory pathways for the relief of gastric crises. In 1912, Spiller and Martin reported the first case of successful chordotomy for the relief of pain due to inoperable carcinoma.

The advantages of this procedure are a greater area of anesthesia is produced, pain and temperature alone are affected, a small laminectomy under local anesthesia is adequate, and at times the pain fibers alone may be cut. Also, once obtained, the relief is usually lasting. The disadvantages are a neurosurgeon should perform the operation, the motor tract may be cut with resultant paralysis and disturbance of sphincter function, severe girdle pain may follow the operation, and the incision may not be deep enough to relieve the pain. The last, however, depends mostly on the power of observation of the patient at the time of operation.

Anatomically, as the name indicates, the tract is found in the anterior and lateral portion of the cord. The very important pyramidal tract lies posteriorly. The fibers which are to make up the anterolateral tract cross in the posterior commissure soon after their entrance into the cord. Therefore, the incision is made on the side opposite the pain if the chordotomy is unilateral. It is also made several segments above the affected area. If a bilateral chordotomy is to be done, the two incisions should be at least one segment apart

TABLE III — THE RESULTS OF CHORDOTOMY

| Reported by | Year | Total Cases | Complete Relief | Partial Relief | No Relief |
|---------------------|------|-------------|-----------------|----------------|-----------|
| Spiller and Martin | 1912 | 1 | 1 | 0 | 0 |
| Beer | 1913 | 1 | 1 | 0 | 0 |
| Frazier | 1920 | 6 | 4 | 2 | 0 |
| Leighton | 1921 | 4 | 4 | 0 | 0 |
| Frazier and Spiller | 1923 | 8 | 6 | 2 | 0 |
| Pett | 1926 | 19 | 16 | 2 | 1 |
| Stebbing | 1929 | 17 | 13 | 2 | 0 |
| Stooley | 1929 | 4 | 4 | 0 | 0 |
| Horrax | 1929 | 8 | 6 | 2 | 0 |
| Bankart | 1929 | 2 | 2 | 0 | 0 |
| Wilson and Fay | 1929 | 2 | 2 | 0 | 0 |
| Beck | 1930 | 1 | 1 | 0 | 0 |
| Grant | 1941 | 109 | 68 | 25 | 4 |
| Total | | 182 | 128 | 35 | 5 |
| Per cent | | 100 | 70.3 | 19.2 | 2.7 |

in order to insure adequate circulation. The chordotomy is usually carried out in the upper dorsal region to obtain adequate relief of pain. Briefly, the operative procedure is as follows.

After the laminectomy has been completed and the dura exposed, this structure is carefully opened. The denticulate ligament is incised near its attachment to the dura and by the use of Frazier hooks is used to rotate the cord. The knife is then inserted anteriorly at the attachment of the denticulate ligament to the cord. The incision is carried to a depth of from 2.5 to 3 mm and the knife is then brought forward to the anterior root. Sensory examination is then carried out and if the area of analgesia is not high enough, the incision is made deeper. After hemostasis, closure is made.

The results of chordotomy in the cases reviewed show that among 182 patients there have been 128 (70.3 per cent) completely relieved, 35 (19.2 per cent) partially relieved, and 5 (2.7 per cent) with no relief. Grant reports the complications in 109 patients who had chordotomy for relief of pain. The procedure was carried out on one side in 55 and bilaterally in 54. There were 12 deaths

TABLE IV — COMPARISON OF RESULTS

| Procedure* | Total Reported | Complete Relief | Per cent | Partial Relief | Per cent | No Relief | Per cent |
|--------------------------------|----------------|-----------------|----------|----------------|----------|-----------|----------|
| Subarachnoid alcohol injection | 494 | 322 | 65.1 | 82 | 16.6 | 87 | 17.6 |
| Presacral neurectomy | 115 | 80 | 70.4 | 19 | 16.5 | 15 | 13.0 |
| Chordotomy | 182 | 128 | 70.3 | 35 | 19.2 | 5 | 2.7 |

*These procedures were carried out for a variety of causes; the majority, however, were for pain caused by pelvic malignancy.

Retention of urine occurred in 6 of the unilateral group and 23 of the bilateral. Motor weakness was noted in 5 of the unilateral cases and 9 of the bilateral.

The operation while not formidable requires the services of a neurosurgeon or at least of a general surgeon well versed in the surgery of the spinal cord. From the results reported and in view of the neurophysiological basis of the operation this means of treatment should give excellent results if the operation is not delayed until the patient is in no condition to undergo such a procedure. The complications tend to decrease the use of chordotomy but the persistent relief obtained is worth the sacrifice.

CONCLUSIONS

1. At the present there is no single method which will bring complete relief of pain in all cases.

2. The importance of the proper selection of cases for each type of treatment has not received its due emphasis.

3. Chordotomy offers the most likely possibility of freedom from pain and should be carried out early enough to keep the operative mortality from being formidable.

4. In the small hospital with limited facilities subarachnoid alcohol injection is the most satisfactory method for control of pain in carcinoma of the cervix.

5. The indiscriminate use of large doses of morphine in all cases of terminal cancer is to be deplored.

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GYNECOLOGY

UTERUS

Brewer, J. I., and Jones, H. O. A Study of the Corpora Lutea and the Endometrium in Patients with Uterine Fibroids. *Am J Obst. & Gynec.*, 1941, 41 733

Ovulation had occurred in a manner similar to that observed in normal women in 100 unselected patients who had been operated upon for uterine fibroids. Forty-six patients had functioning corpora lutea of the present cycle. Not counted among the 46 patients were many patients who were listed as not having corpora lutea of the present cycle but of the previous cycle which were in the regression phase. Their presence suggested that ovulation, corpus-luteum development, and the endometrial response had occurred normally in the preceding cycle. The findings indicated that ovulation took place most frequently about the midpoint of the menstrual cycle, as in normal women. Four of these 100 patients were pregnant or had a complication of pregnancy at the time of operation. This indicated positively that ovarian function can be normal in women with fibroids.

There were two corpora lutea with identical development in the ovaries of each of 4 patients. In another patient, there were two corpora lutea in one ovary and one in the other ovary, all having the same degree of development. Multiple ovulation occurs in normal women in approximately the same number of instances as were found in these 100 patients. Ovulation in 3 instances occurred during a prolonged phase of active uterine bleeding. In only 1 of 37 patients with normal menstrual cycles, ovulation had failed to occur by the fifteenth day. In 14 patients complaining of abnormal uterine bleeding, ovulation had not occurred by the fifteenth day, but in 21 it had occurred by that time.

The development of the corpora lutea was normal in 41 of the 46 patients. Evidence that the development was normal was obtained by histological study of the corpora lutea and by the histological study of the endometrium, which gave the characteristic responses to normal corpus-luteum hormonal stimulation. In the patients with abnormal uterine bleeding, the normal relationship between the corpus luteum and the endometrium was maintained in most instances.

So-called cystic glandular hyperplasia was present in a moderate degree in only 1 instance in the entire group of 100 patients with fibroids. This finding is at marked variance with the generally accepted clinical impression. EDWARD L. CORNELL, M.D.

Papanicolaou, G. N., and Traut, H. F. The Diagnostic Value of Vaginal Smears in Carcinoma of the Uterus. *Am J Obst. & Gynec.*, 1941, 42 193

During the past two years the authors have collected and studied many hundreds of vaginal smears

from normal women and women suffering from gynecological disease, and they believe that cells pathognomonic of cervical and fundal carcinoma can be definitely recognized. They are not yet in a position to offer a statistical proof of the reliability of this method of diagnosis, but can say that it yields a high percentage of correct diagnoses when checked by tissue biopsies. There is evidence that a positive diagnosis may also be obtained in some cases of early disease.

The simplicity of the method, the lack of inconvenience to the patient during its application, and the possibility of obtaining daily information over a long period of time make this method very useful in following the progress of the disease after operative procedures or x-ray treatments. The method makes the material for examination easily and frequently obtainable at low cost, the interpretation of the smear requires the services of a careful and discriminating cytologist who has had experience in this field. EDWARD L. CORNELL, M.D.

Bowing, H. H., and McCullough, J. A. L. Carcinoma of the Cervix Uteri in Childhood and Adolescence. *Am J Roentgenol.*, 1941, 45 819

Although carcinoma of the cervix uteri among patients between the ages of twenty and thirty is not at all uncommon, it is rarely found in younger patients. Because of the rarity of the disease among patients twenty years of age or younger, the difficulties usually encountered in making the diagnosis, and the emphasis placed on the so-called cancer age, the diagnosis of this condition among young women is frequently confused or missed entirely. The necessity of making a careful manual and visual examination as well as a histopathological examination, of any tissue which may be at all suspicious cannot be overemphasized.

A review of 3,000 patients suffering from malignant disease of the cervix uteri who had been referred to the Mayo Clinic for examination and treatment revealed only 1 patient twenty years of age or younger. The authors presented a summary of the history of this patient. Carcinoma of the cervix is essentially a disease of older women, the average age of the patients being forty-nine years. This incidence does not mean that carcinoma of the cervix does not occur at a younger age. Epitheliomas are found much more frequently than the glandular type of carcinoma. However, among younger groups of patients a predominance of epitheliomas does not seem to be the rule, since of the 12 cases reported in the literature, in which a histopathological examination was made, the lesion proved to be an epithelioma in only 2, whereas in 10 it was adenocarcinoma.

In the case the authors presented the tumor was a modified lesion in Stage 1, whereas in the large majority of cases of carcinoma of the cervix the lesions

are in the inoperable stage when the patients are first seen. The response of the patient in the authors' case to radiotherapy corresponded to those of the patients who had modified lesions in Stage I as reported in other groups of cases.

The need for individualization in the management of such patients is apparent from the report presented concerning the authors' patient. In addition the need for the closest co-operation between the radiologist, pathologist and surgeon is further emphasized. The physician or surgeon should not exclude the possibility of the presence of carcinoma because of the age of the patient. In all cases a vaginal and rectal examination including palpation and inspection should be made and multiple biopsies may be necessary if there is the slightest question about the diagnosis.

ADNEXAL AND PERIUTERINE CONDITIONS

Kante A. E. and Kilians A. H. Arrhenoblastoma of the Ovary. *Am J Gynecol* 94: 40-474

This is a case report with comments on the differential diagnosis of arrhenoblastoma of the ovary from basophilic adenoma of the pituitary gland and the adrenogenital syndrome.

A thirty-three-year-old white para II gravida first came under the authors' supervision in February 1938. Her complaints included abnormal growth of hair on the face and body, atrophy of the breasts, huskiness of voice, amenorrhea, an abdominal tumor, nervousness, headache, dizziness, and weakness. These symptoms started six months after the birth of her second child, i.e., three and one-half years before the authors first saw her. Following this puerperium she menstruated at two-week intervals until August 1934 when menstruation stopped. She was then twenty-nine years old. She had observed a gradual development of hair on the face, chest, body, and extremities together with a thickening and coarsening of the hair on her head. Hairs on her arms had grown to an inch in length and hair on her chin and upper lip became so heavy that it was necessary for her to shave daily. She had lost about 60 lb. There was a change in the distribution of subcutaneous fat and the breast had flattened. Two years previously she had suddenly lost her voice for two weeks, since then she had talked like a man. Libido had been lost. For about two years she had noticed a tumor in the abdomen which had gradually become larger until it completely filled the abdominal cavity and extended to the xiphoid process. Acne was present over the face and upper chest. The pubic hairs were very long and coarse and presented an escutcheon similar to that of the male. The labia majora were atrophic and the clitoris was elongated almost three times normal size.

At operation the tumor was found to be a right ovarian cyst. The left ovary was elongated and sclerotic. The uterus was small.

Following operation the patient menstruated at intervals of three weeks. The breasts gradually re-

turned to their normal size. Her general condition improved and her appetite was excellent. Some of the hair remained on the chest and forearms but it was definitely softer and lighter in color. She still needed to shave but only once every two weeks. Sexual relations also became normal.

Pre-operative urinary chemical studies showed essentially normal sodium chloride and normal creatinin but the sodium and potassium levels were both markedly lowered. Blood chemical studies before operation showed normal urea nitrogen and non-protein nitrogen together with a lowered sodium and an elevated potassium level. Hormonal studies on the urine showed a high normal or slightly increased male sex hormone output.

This tumor was a multilocular cyst which contained necrotic material and bloody fluid. There was also considerable dense tissue throughout its structure. It apparently was a teratomatous growth which contained various male elements. Some section presented a picture that corresponded to an incompletely developed rete. Others resembled the spermatic ducts close to the rete. Other sections were mesenchymatous teratomatous tissue while others corresponded to embryonic male genital cord with large spermatogones representing typical arrhenoblastoma tissue.

In the discussion most of the authors agreed that the site of production of the male sex hormone is in the interstitial cells of Leydig. These cells are capable of producing large amounts of sex hormone so that relatively few of them in a tumor can obtain complete mastery over the ovarian function. The amount of defeminization and masculinization in any given case varies directly with the activity of the existing Leydig cells.

In differential diagnosis when virilism exists in the female one must consider arrhenoblastoma of the ovary, Cushing's syndrome, and the adrenogenital syndrome.

Cushing's syndrome, i.e., basophilic adenoma of the pituitary gland, is characterized by hypertenchesia and amenorrhea without hypertrophy of the clitoris or larynx. In addition there is hypertension, glycosuria, obesity about the face, neck, and trunk, acrocyanosis, purplish staining of the thighs, interference with the visual fields, but there is no pelvic tumor.

The adrenogenital syndrome is more difficult to differentiate from arrhenoblastoma. There is amenorrhea, hypertrophy of the clitoris, laryngeal enlargement, but minimal breast atrophy, change in the fat distribution, and loss of libido. Some arrhenoblastomas are so small that they elude the most careful examiner; on the other hand, perineal injections do not always reveal small adrenal tumors. Hormone studies are not helpful although careful blood and urine chemical examinations may be pertinent. In the presence of adrenal tumor there is hypertension associated with decrease in the serum sodium and an increase in serum potassium. The urinary sodium is increased and the potassium

is decreased. Furthermore, nitrogenous retention in the blood serum is usually quite marked with the adrenogenital syndrome.

GEORGE H. GARDNER, M.D.

EXTERNAL GENITALIA

Di Paola, G. Vaginal Cytology and Ovarian Function in Woman (Citología vaginal y función ovárica en la mujer) *Rev méd-quirurg de patol femenina*, 1941, 9, 229

The discovery of simple and practical methods to evaluate the functional activity of the ovary is of capital importance for the correct interpretation of endocrine disturbances in gynecology. Biopsy of the endometrium reveals the condition of the generative function of the ovary and, if done during the second half of the menstrual cycle, allows investigation of the presence of the pregestational phase. However, in many cases there is insufficiency of the generative function of the ovary while its trophic function remains intact, under the circumstances, the study of the cytological content of the vagina is very useful because it reflects the condition of this vegetative function. In 1933, the use of vaginal smears was proposed to learn the condition of the epithelium and later the method was employed to evaluate the therapeutic action of the estrogens in the natural or surgical menopause and in infantile vulvovaginitis. At present the use of the method is indicated in cases of functional disturbances of the ovaries, in the menopause, and in the course of hormone therapy.

Di Paola describes the vaginal epithelium and states that the cells of any layer, with the exception of the germinative layer, may be found in vaginal smears. He discusses the changes presented by the vaginal epithelium during the different periods of the life of the woman from birth to old age, and insists on the impossibility of deducing the day of the menstrual cycle from the vaginal smear. To obtain material for the smears, he introduces a pipette containing a few drops of physiological salt solution up to the middle third of the vagina, expels the solution, and then allows it to re-enter the pipette. He stains the smear with alcohol fuchsin for one or two minutes and washes it under tap water, he counts 100 cells, the classification of which gives the vaginal cytological formula.

In his experiments to establish the threshold of vaginal response to estrogen in women, he found that the proliferation dose varies from 2,000 to 3,000 international benzoate units (estradiol benzoate). All changes produced by the estrogens disappear when the treatment is suspended. He discusses the use of vaginal smears in the clinic and presents the following conclusions:

The vaginal smears reflect faithfully the condition of the epithelium. The monthly variations of the smears have no practical importance. The threshold of response of the vaginal epithelium to the estrogens is not lower than that of the endometrium. The

vaginal epithelium denotes the condition of the trophic function of the ovary. The study of vaginal smears is important in daily practice to indicate the rational treatment in amenorrhea and in the menopause.

RICHARD KEMEL, M.D.

MISCELLANEOUS

Skajaa, K. Hyperalgesic Zones in the Soft Parts Around the Pelvis as a Symptom from the Plexus Hypogastricus *Acta obst et gynec scand*, 1941, 21, 13

The author discovered that many gynecological patients have areas of hyperalgesia of the skin around the pelvis, on the back, and extending down the legs. This hyperalgesia varies in extent, a classical example is shown in Fig. 1. Such areas of hyperalgesia occur not only in patients suffering from "plexalgia hypogastrica" but also in those with premenstrual distress and other abdominal pains. The zones of hyperalgesia are delineated by lightly pricking the skin with a pin point and relying on the patient's sense of the severity of pain to define the involved areas. The degree of hyperalgesia varies, it may be slight or quite severe and usually is most marked in those women who have the most extensive areas of involvement. It seems to be limited to women in the sexually mature age. In studying 315 gynecological patients the author found that 33 per cent had no hyperalgesia, 14 per cent had only a trace, 12 per cent had slight involvement, 21 per cent had medium involvement (as in Fig. 1), and 20 per cent had more extensive involvement.

Large zones of hyperalgesia were found in many patients whose sole complaint was sterility and whose tubes were patent. After resection of the presacral nerve many became pregnant. The author

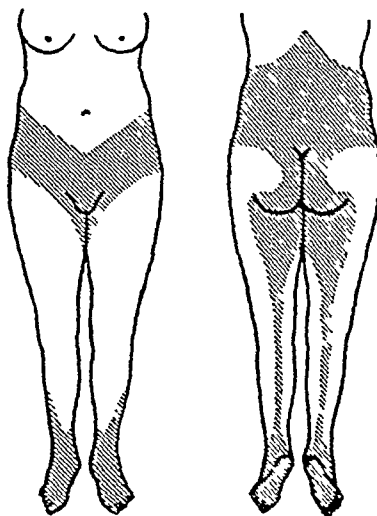


Fig. 1

has never observed a patient who failed to develop zones of hyperalgesia during pregnancy.

The inferior hypogastric plexus supplies the uterus, rectum and bladder and is connected with the spinal cord by two pathways: (1) the pelvic nerve the fibers of which run to the third and/or fourth sacral segments and (2) the presacral nerve the fibers of which usually run to the twelfth dorsal and/or the first lumbar segments of the cord. The hyperalgesic zones are found in the skin innervated from the twelfth dorsal and first lumbar segments as well as from the third and fourth sacral segments.

None of the patients with hyperalgesia of the skin presented gross genital pathology. By resection of the presacral nerve the pathological innervation of the sympathetic system to the uterus is interrupted. Abnormal nervous impulses cease to arise in the uterus and the overburdened centers in the spinal cord come to rest. This type of hyperalgesia of the skin is probably produced by an irritative condition in the medullary portion of the spinal cord.

GEORGE H. GARDNER, M.D.

Fraenkel, L. Three Years of Gynecological Endocrinology with Some New Observations. *Tres años de ginecología endocrina con algunas observaciones nuevas*. Arch. Uruguay de med. 8, 9 e period. 941, 13, 93.

In this article on gynecological endocrinology the author discusses the anomalies of menstruation. He first mentions amenorrhea resulting from the failure of ovulation. In 90 per cent of the cases amenorrhea follows fertilization of the ovum of the last ovulation. The decidua is formed and menstruation ceases. Other causes of amenorrhea are aplasia or atrophy of the ovary, persistent or cystic corpus luteum and ovarian tumors, disturbances of the pituitary, thyroid, suprarenal and pancreas glands, hemorrhage, suppuration and diseases of the blood, such as anemia, leucemia, chlorosis and purpura, ascites, hydatid cysts, other parasites, tuberculosis, carcinoma, sarcoma and stubborn diarrhea. There are also amenorrhoeas of obscure origin such as those due to late puberty or an early climacteric, malnutrition, change of diet or climate and psychic shock. The author briefly defines hypo-oligomenorrhea, slow, vicarious menstruation, menstruation without ovulation and menstrual molimina (the discomforts occurring after hysterectomy when the ovaries have been left within the abdomen).

The author next considers the problem of sterility which may be either primary or secondary. There is absolute infertility or the inability to bear children who will survive which is due to (a) habitual abortion, (b) premature births or (c) stillbirths, whether intra uterine or extra uterine. These varied conditions may be due to a variety of causes such as lack of progesterone, infantile uterus, cervical tears, retroversion, endometritis, fever or infection. Finally, there may be a lack of Vitamin E or of certain necessary minerals such as calcium and phosphorus or there may be heart disease, nephritis or syphilis.

In all cases of sterility the husband should also be examined.

The following new hormone preparations are mentioned: (1) testosterone propionate which is used in gynecology for (a) menorrhagia, (b) hyperemesis of pregnancy, (c) mammitis, galactorrhoea and hyperlactation and (d) nymphomania, (2) progynon (Scherling) with which the author has had no personal experience, (3) serum of pregnant mares which includes luteo-antiox and gonadogens, the latter being prepared from the serum of a mare which has been pregnant for seventy days and when injected intravenously will induce immediate ovulation, (4) serum of pregnant women and (5) stilbestrol, a new synthetic preparation which is similar to folliculin in activity and indications but which is 5 times more efficacious and 5 times more dangerous than the latter. The literature indicates that stilbestrol is a good preparation to interrupt the flow of milk.

Among the surgical procedures mentioned are: (1) neo implantation of the tubes anteriorly into the uterus, (2) implantation of the tubes into the uterine cavity (Strassman's operation), (3) implantation of the ovaries inside the uterine cavity after salpingectomy (Tulfer's operation) with resultant conception and normal labor, (4) implantation of the endometrium into the uterine muscle or into the vagina, (5) formation of a new vagina in cases of vaginal aplasia, (6) implantation of a double uterus with satisfactory resultant labor, (7) decortication of the ovaries in cases of sclerosis with dysmenorrhea and (8) sympathectomy for dysmenorrhea (Cotte's operation).

The author then briefly discusses the secondary female characteristics such as the mammary glands, the sexual organs, the pelvis and the distribution of hair. He notes that hypertrochosis may occur in the sacral region of both sexes without special significance, however, in some instances it may be associated with spina bifida.

The author has seen numerous cases of infantile, These may be combined with hypophyso-adiposo-genital dystrophy and dementia praecox. The pelvis is narrow and the pubic arch narrow and high.

There is a brief description of certain clinical gynecological cases which the author has observed among the 2000 he has studied during the past three years: (1) a woman pregnant for six weeks with corpus luteum cyst, (2) a pregnancy of four months duration with bilateral dermoid cysts of the ovaries and (3) a twenty-eight year old woman who had had amenorrhea for five months associated with masculinization symptoms, recovery followed extirpation of the ovaries and microscopic study showed typical luteoma.

According to the author, fibromyomas seem to be of endocrine origin. Lipschutz was able to induce these tumors in all of 100 attempts in guinea pigs by injecting small doses of folliculin. The fibromyomas diminished in size when the function of the uterus was inhibited, whether by the climacteric, surgery or treatment with x-rays or radium.

GYNECOLOGY

Finally, there is a brief discussion of a variety of miscellaneous subjects, such as adiposity, lactation, genitalia in dwarfs, and microscopic changes in a number of conditions

JACOB E. KLEIN, M.D.

Lipschuetz, A., and Vargas, L. The Prevention of Experimental Fibroids by a Cortical Hormone, *Lancet*, 1941, 240: 568

Uterine and extragenital abdominal fibroids can be produced in laboratory animals by the prolonged administration of estrogens; these tumors can be prevented when either testosterone propionate or progesterone is injected simultaneously with the estrogen. However, it requires 50 times as much testosterone propionate as estradiol or 150 times as much progesterone, to completely prevent the development of fibroids. Uterine fibroids can be completely prevented also when tablets of progesterone are implanted simultaneously with the estradiol.

Cortical hormones are quite similar chemically to progesterone and it was thought that the adrenal glands might produce a hormone, or hormones, which would exert an inhibiting action on the effect of estrogens. Desoxycorticosterone bears the greatest similarity to progesterone and it can be produced by synthesis. The acetic ester of synthetic desoxycorticosterone was employed in this study.

Castrated female guinea pigs were used and tablets of estradiol and desoxycorticosterone were implanted simultaneously under the skin. In a control series, only estradiol was implanted. Several in-

teresting clinical observations were made. The vagina opened three days after the implantation of the tablets in the estradiol group, whereas in the animals given both estradiol and desoxycorticosterone, the vagina opened but closed after about two weeks. Genital bleeding appeared in one-third of the animals given only estradiol, usually one month after implantation; it was never observed in the other group. Necropsy was performed on the animals about two months after the implantations given estradiol and desoxycorticosterone; there were no uterine fibroids and only a minimum of small extragenital fibroids. The enormous development of the uterus seen in the estradiol group was not present in the other group. The influence of cortical hormone on the development of the mammary glands and nipples was not inhibited by the estradiol and the cortical hormone had no masculinizing effect on the clitoris.

Consequently, these experiments prove that cortical hormone completely prevents the production of uterine fibroids and reduces the extragenital tumoral reaction to a minimum. This hormone also prevents uterine bleeding and obviates other toxic effects of prolonged treatment with estrogens. The amount of desoxycorticosterone necessary to inhibit the tumoral action of estradiol is only about three times the amount of the latter, when these hormones, in tablet form, are implanted beneath the skin.

GEORGE H. GARDNER, M.D.

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Pirrelli G: Daily Variations of the Blood Urea in Albuminurias of Pregnancy (*L'oscillazione durna dell'ureazotemia nelle albuminurie gravidiche*) *Atti del Soc. Ital. di Ostet. e Ginec.* 1941 37 15

In his experiments to determine the daily variation of the blood urea in albuminuria of pregnancy the author first determined the level of blood urea by means of the hypobromite test of Ambard. The blood was collected three times a day (8 A.M., 2 P.M. and 8 P.M.) from the same subject kept on the usual diet. Sixty cases were examined. Nineteen were pregnant women in the ninth month of pregnancy without any albumin in the urine; 18 others had a small amount of albumin. In another group of 9 cases the pregnancy was complicated by high blood pressure, edema, cylindruria and severe albuminuria. The blood urea was tested in a control group of 8 young non-pregnant women and in 9 cases of acute renal inflammation.

When the amount of blood urea nitrogen showed a slight difference (not more than 0.03 per cent) in the results of the three daily determinations no functional impairment of the kidney developed in the course of pregnancy. A relative independence from the diet is therefore claimed by the author. In cases of pregnancy toxemias the daily variations were ample and generally proportional to the seriousness of the renal damage. However, strangely enough, even in the most serious toxemias of pregnancy as in eclampsia they never reached a level comparable with that occurring for instance in acute glomerulonephritis.

The author draws the conclusion that the pre-eclamptic syndromes and eclampsia itself do not affect the kidneys as intensively as the dramatic functional symptomatology would suggest. In the determination of blood urea variations it is important that observations be made on the same patient for several days as a twelve-hour period is not sufficient for drawing conclusions.

EMANUELE M. MIGLIARDI M.D.

Cutler T: A Study of Hepatorenal Function in the Toxemias of Pregnancy (*Contributo allo studio della funzione epato-renale nelle tossiemi gravidiche*) *G. eccl. ginec. T. rin.* 1941 7 17

The author discusses the various tests for functional activity of the liver and kidney and gives in detail the technique for determining Maillard's coefficient. He then studies the application of these tests in 8 cases of hyperemesis gravidarum, 26 cases of albuminuria and nephropathy in pregnancy and 8 cases of eclampsia. Tables are given showing the details of the results.

In hyperemesis gravidarum he finds that the organ most seriously injured is the liver as shown by

acetoneuria, urobilinuria, bilirubinemia and a high Maillard coefficient which is a true coefficient of acidosis. On the other hand kidney function is almost normal as shown by absence of albumin and casts in the urine, normal azotemia and low blood pressure.

However, in the nephropathies of pregnancy kidney function is much more seriously impaired than the function of the liver as shown by albumin and casts in the urine, high azotemia and high blood pressure.

In eclampsia the function of both the liver and kidneys is seriously impaired; all of the functional tests show more or less deviation from normal.

The type of liver injury in eclampsia is different from that in hyperemesis gravidarum, particularly in the absence of acetoneuria. The mechanism of the acidosis shown by the high Maillard coefficient differs in the two diseases. In hyperemesis it is due to the accumulation in the blood of ketone bodies which are intermediate products of the abnormal metabolism of fats, while in eclampsia it is due to the accumulation in the blood of intermediate acid products of protein metabolism, among which Zweifel demonstrated sarcosylactic acid which is derived from muscle albumins.

He believes therefore that his study confirms the theory that eclampsia is not merely an aggravated condition of pregnancy nephropathy but is an essentially different disease marked by pathological conditions in the liver also. None of the tests used in determining liver and kidney function is decisive in itself but taken in conjunction with the others and the clinical findings it gives a good idea of the function of these organs.

As to Maillard's coefficient the author finds it of decided value in hyperemesis in which condition it shows the condition of the liver function and the degree of acidosis. It is of value not only in diagnosis but in prognosis and helps one to determine when therapeutic interruption of pregnancy becomes necessary. It is of less value in nephropathy and eclampsia in which conditions the decisions must be based on other clinical and laboratory data. In eclampsia immediate action based on the clinical picture alone is often necessary.

AUDREY G. MORGAN M.D.

Kapeller Adl. R. R. The Histidine Metabolism in Normal and Toxemic Pregnancy. The Excretion of Histidine in Normal Pregnancy Urine and in the Urine of Patients with Toxemia of Pregnancy. *J. Obst. & Gynec. Brit. Emp.* 1941 48 41

Histidine is a constituent of the urine throughout normal human pregnancy; the excreted amounts ranging between 15 and 50 mgm. per cent. This can be determined qualitatively by a simple color test.

tion The author has used it as a test for pregnancy A small proportion (3 per cent) of false positive reactions were obtained in non-pregnant women False negative reactions were rarely observed The technique of the test is described Histidinuria is not appreciably affected in cases of mild pre-eclamptic toxemia, but is considerably diminished in patients with serious symptoms of pre-eclamptic toxemia In cases of severe pre-eclamptic toxemia only traces of histidine are found in the urine So constant are these findings that a marked diminution or total absence of histidine excretion can be used as a diagnostic sign of severe toxemia of pregnancy

DANIEL G. MORTON, M D

Kapeller-Adler, R The Significance of the Isolation of Histamine from the Urine in the Toxemia of Pregnancy *J Obst & Gynaec Brit Emp*, 1941, 48 155

It is suggested that histamine plays an important role in toxemia of pregnancy

The different manifestations of the intoxication with their different symptoms and events may finally depend on the pregnant woman herself, on her adaptability to the changed conditions, and on the state of nutrition of her body The normal pregnant woman will more or less easily adapt herself to changes which result from the altered metabolism, and will soon overcome the trouble which perhaps small amounts of histamine, intermediately occurring, will inflict upon her The sensitiveness of pregnant women towards histamine may vary with the individual

The term toxemia of pregnancy should be maintained, since a real toxin (histamine) has been found to be excreted in the urine in cases of severe toxemia of pregnancy

A comparison of the biological action of histamine with the symptoms of toxemia of pregnancy reveals a close similarity, the opinion is expressed that histamine may be assumed to be a causative factor in this disease It is suggested that histidine, which occurs in large amounts in normal pregnancy, may have a protective effect against histamine This would fit in with the absence of histidinuria in cases of severe toxemia

DANIEL G. MORTON, M D

Blazsó, S, and Dubrauszky, V The Role of the Vasopressor and Anti-Diuretic Hormones of the Posterior Lobe of the Hypophysis in the Pathogenesis of the Late Toxemias of Pregnancy (Die Rolle des vasopressorischen und antidiuretischen Hormons des Hypophysenhinterlappens bei der Pathogenese der Spätschwangerschaftstoxikosen) *Arch f Gynaek*, 1940, 170 651

By employing the extraction method of Hoffmann and Anselmino and of Marx and Schneider, in addition to the hormone determination study of Burn and Simon, the authors were unable to demonstrate vasopressor or anti-diuretic substances in the blood of 8 women with late toxemia of pregnancy However, from the urine of these women and that

of 4 others with late toxemia they were able to prepare an extract by the method of Gilman and Goodman and to prove by the method of Burn or Simon the presence of vasopressor or anti-diuretic action Each time the anti-diuretic effect was from three to five times stronger than was expected Vasopressor and anti-diuretic substances were also found in the urine of 3 of 9 women with normal pregnancy

The authors take the position that the vasopressor and anti-diuretic substances arise in part from the posterior lobe of the hypophysis It is possible that such substances could originate in other places also It is unlikely that the increase of the vasopressor and antidiuretic substances plays a primary role in the late toxemias of pregnancy It is more likely that the more frequent appearance and the increase of such substances in the toxemias of pregnancy is the result of a pathological reaction in the hypophysis or even other organs These pathological reactions are caused by injuries which are responsible for the onset of the late toxemias of pregnancy The acceptance of a primary role by the hormones of the posterior lobe of the hypophysis for the late toxemias of pregnancy is rejected

(BUETTNER) MARIAN BARNES, M D

LABOR AND ITS COMPLICATIONS

Paucot, H The Indications and Technique of the Test of Labor (Indications et technique de l'épreuve du travail) *Rev franç de gynéc et d'obst*, 1941, 36 65

Paucot has found that the test of labor is indicated in some cases of contracted pelvis in which the bony pelvis is not so small as to make delivery by the natural route impossible While the size of the pelvis cannot be altered, other factors in labor are variable, such as the pliancy of the fetal head and the strength of the uterine contractions, and their effect can be determined only by trial

If the sacropubic or conjugate diameter is less than 8 cm, a test of labor is not indicated in delivery at term The findings by internal pelvimetry should be supplemented by roentgenography, which shows the shape of the pelvis and the position of the head The test of labor is indicated only if the presentation is normal, if the placenta and its site of attachment are normal, and if the general condition of the patient is good If the patient has been delivered previously, the history of the previous labor is of importance in determining whether a test of labor should be made If there is a history of a previous cesarean section, the test of labor, if indicated at all, should be of short duration

During the test of labor the patient must be kept under careful supervision, the strength and rhythm of the uterine contractions, the progress of the dilatation of the cervix, and the condition of the fetal heart must be carefully watched If the uterine contractions are strong and frequent and the cervix has dilated to from 4 to 5 cm, the membranes may be artificially ruptured if necessary, as the fetal head

then assumes a definite position and it can be determined whether or not this is favorable for delivery. If uterine contractions are normal and dilatation proceeds regularly the test of labor does not need to be prolonged beyond two or three hours to determine whether the child can be delivered normally if there is some dystocia and delay in dilatation the test may be prolonged for from four to six hours.

In the series of cases in the author's obstetrical service at Lille in which the test of labor was made during 1938 and 1939 there were 6 cases in which the conjugate diameter measured from 8 to 8.5 cm. in this group only 2 patients were delivered normally. Among 21 cases with conjugate diameters between 8.5 and 9 cm. there were 10 normal deliveries among 38 cases with conjugate diameters between 9.5 and 10 cm. there were 25 normal deliveries and 13 operative deliveries. From these results he concludes that a test of labor is not indicated with a conjugate diameter less than 8.5 cm. unless the child is very small but with lesser degrees of contracted pelvis normal deliveries may be obtained in a satisfactory percentage which varies from 50 to 70 per cent. In all cases in which the test of labor failed a low cesarean section was done. There were no maternal deaths in this series and only 1 fetal death due to meningeal hemorrhage. The mother in this case had pre-eclamptic toxemia during pregnancy. With low cesarean section there was no operative infection and the puerperal morbidity was low. It is evident that a test of labor in selected cases and if not too greatly prolonged does not affect the results of low cesarean section unfavorably and it may render operative delivery unnecessary in a considerable percentage of such cases.

ALICE M. MEYERS

PUERPERIUM AND ITS COMPLICATIONS

Caffaratto T. M. Puerperal Thrombophlebitis (Leit. mboflebit puerperal) G. of the Tor. 9417

This study is based on the material of the Obstetrical and Gynecological Clinic and of the Maternity Hospital of Turin to which 4,827 patients have been admitted during the past fifteen years. There were 71 with thrombophlebitis the percentage being 0.19 for 36,697 deliveries and 0.09 for 3,654 abortions. This study does not reveal any increase in puerperal phlebitis but only annual variations due to secondary causes.

The pathogenesis of the disorder is still under discussion. The anatomical reasons advanced to explain the frequent occurrence of phlebitis in the left lower extremity and to confirm the theory of its mechanical origin through circulatory defect are of only secondary importance in the puerperal field in which special causes due to the circulatory changes occurring during pregnancy are added to the natural difficulties of the pelvic circulation to predispose an extremity to phlebitis. Even grave anemia which preceded phlebitis in 16.8 per cent of

the cases cannot be considered as a principal cause of the accident. The changes in the vascular intima are insufficient to cause the formation of a thrombus according to recent experiments. The changes in the blood due to physicochemical, biological and morphological upsets have been given as basic causes of the thrombotic alterations and the conditions found in postoperative thrombosis seem to support this view. During pregnancy there are changes in the blood which are somewhat similar to those of the postoperative period but they undergo great variations during the first days of the puerperium and cannot be accepted as the general and principal cause in the origination of phlebitis. The infectious factor has been greatly favored by clinicians and special importance has been attributed to it. The supposition that the bacterial factor is the principal one is confirmed by the data obtained in the present cases, the large number of complications of pregnancy, protracted labor and the high percentage of surgical deliveries to this must be added the fact that thrombosis like infection often passes from bed to bed in the ward.

It is now established that phlebitis of the extremity usually derives from a metrophlebitis by spreading of the process through the hypogastric, common and external iliac vessel to those of the extremity. Among the forms of pelvic phlebitis are the latent type and those with uterine and peruterine or with vesical or intestinal symptoms. The diagnosis of pelvic phlebitis is of great value as a warning of possible phlebitis of the extremity.

The symptomatology of puerperal phlebitis includes general signs and signs in regions outside of the extremity and in the extremity. General signs are a rise of temperature, rapid pulse, chills and nervous agitation. Local signs outside of the extremity are pelvic symptoms and thrombotic localizations in the pulmonary circulation (62 per cent in the present material). The phlebitis occurred on the left in 84 per cent of the cases and was bilateral in 32 per cent. The local symptoms consisted of pain, edema, changes in the heat and color of the skin, venous spasms, changes in the sudoriparous and polymot reflexes and vicarious superficial venous network. The first two symptoms are important for early diagnosis. The most frequent and easily sites of the pain are the calf of the leg and Scarpa's triangle (33.8 per cent each). Edema usually starts in the sole of the foot, the calf, the internal aspect of the thigh and the inguinal fold. The swelling is generally made on the basis of pain and swelling and in most cases during the second ten days of the puerperium but judging from the time of appearance of the pain a large number of cases of phlebitis begin during the first ten days.

The average duration of the disorder when treated with an adhesive plaster bandage (Jaeger-Fischer method) is about ten days. The prognosis depends on the occurrence of fatal embolism, the incidence of which was 0.1 per cent of all admissions and 8.4 per cent of the cases of phlebitis. A great variety of

methods and medicaments are used for prophylaxis cardiovascular prophylaxis by drugs and adequate posture or ligation of the extremity are important. Early rising has been much discussed, and many recommend active and passive gymnastics in bed. Early treatment, consisting of appropriate diet, general measures, and anti-infectious measures, is important. Leeches are used locally. The recent method of Jaeger-Fischer has given excellent results, as it decreases the duration of the disorder and its sequelæ, the method should be applied simultaneously to both extremities in suspected cases or at least in those in which the general and pelvic symptoms suggest the spread of the phlebitis. RICHARD KEMEL, M D

MISCELLANEOUS

Neuweiler, W., and Stucki, A. Polypeptides in the Serum During Normal Pregnancy, Labor, and the Toxicosis of Pregnancy (Ueber die Polypeptide im Serum bei der normalen Schwangerschaft, im Wochenbett und bei Gestosen) *Klin Wchenschr*, 1940, 2, 1265

The authors state that during pregnancy an increase in serum polypeptides was observed. The amounts increased from 6.3 to 9.8 mgm per cent in healthy, non-pregnant women, to 15 or 16 mgm per cent of nitrogen.

During labor a slight decrease of the polypeptide content frequently occurred, but during the puerperium, the authors claim, there was an increase of the polypeptides to above 20 mgm per cent of nitrogen. In the blood serum of the umbilical cord a slight increase above the norm of serum polypeptides was observed. However, compared with the serum of the respective mother, there was noted a decided decrease which averaged about 12 per cent.

During pregnancy toxemias, at the beginning as well as at the end of the pregnancy, no further increase of the polypeptides could be found.

Since the polypeptides generally are considered to be a decomposition product of albumin metabolism, it must be assumed that albumin decomposition undergoes a slight increase during pregnancy, and a marked increase during the puerperium. In the toxicosis of pregnancy no special increase was noticed (W. NEUEWEILER) MATTHIAS J. SEIFERT, M D

Krieger, V. L., and Rome, R. McK. Toxemic Pregnancy in Relation to Subsequent Pregnancies, with Special Reference to Renal Function Tests. *Med J Australia*, 1941, 1, 597

The authors have analyzed the histories of 652 patients whose renal efficiency had been determined by chemical tests during an initial toxemia, and who had had at least one subsequent pregnancy (at the Women's Hospital, Melbourne) during the last ten years.

These patients were divided into the following groups: (1) those suffering from albuminuria for one day only, (2) those suffering from albuminuria for from two to four days, (3) those suffering from al-

buminuria for longer than four days in the antepartum and post-partum periods, frequently with raised blood pressure and edema, (4) those suffering from pre-eclampsia characterized by raised blood pressure, edema, and albuminuria, in conjunction with two or more of the following symptoms: headache, eye signs, blurring of vision, vomiting, and epigastric pain, (5) those suffering from chronic nephritis, (6) those suffering from eclampsia, (7) those who had accidental hemorrhage of the non-traumatic type, and (8) those suffering from pyelitis. A detailed statistical analysis of the findings in each of these groups is given.

Analysis of the remote pregnancies has shown that when the first subsequent pregnancy was normal or ended in abortion, few toxemias occurred in later pregnancies except when the initial toxemia had been eclampsia. When the first subsequent pregnancy is toxemic, a considerable number of toxemias occur in the following pregnancies. These observations support Young's suggestion that if two toxemic pregnancies occur, further pregnancies should be prevented.

It was not possible to conclude from the material available what type of toxemia most frequently results in chronic nephritis. The mild toxemias are seldom followed by toxemia in later pregnancies, but if toxemia does occur it is usually of a milder type. When severe toxemia has occurred there is a probability of recurrence in later pregnancies. The toxemia will often be severe and frequently of the same type as the initial toxemia.

The earlier the albuminuria appears in the initial toxemia and the longer it persists, the greater is the chance of recurrence of toxemia. It has been proved from the observations that if albuminuria persists for as short a time as from four to eight days, the risk of later toxemic pregnancies is definitely increased. It has therefore become the practice in this hospital to curtail the time in which a patient is allowed to continue pregnancy with albuminuria which fails to respond to treatment. Pregnancy is usually terminated when albuminuria fails to respond to treatment within five days.

One of the most important factors in the course of a toxemia is kidney function. In the evaluation of renal efficiency the use of the tests for albumin in the urine and the amount of urea in the blood have not given sufficient information. High blood urea values occur only when the kidney damage has become very pronounced. The urea-concentration excretion and Fowweather clearance tests offer a valuable means for detecting intermediate as well as gross degrees of kidney damage, and give information regarding improvement or deterioration of the kidney function. As normal results to the tests are not infrequently encountered in toxemic pregnancy, it is evident that in spite of its importance the kidney is certainly not the primary cause of toxemias.

The most serious result revealed by the analysis of the birth figures is that in 651 toxemic pregnancies only 418 living babies were born. This amounts to

not more than 64 per cent of living babies among this group of patients. Another not worthy feature is the high incidence of abortions in subsequent pregnancies. Such figures at a time when emphasis is being laid on the need for increasing the population indicate the necessity for further research into the cause and therapy of the toxemias as one of the foremost obstetrical problems.

DANIEL G. MORTON, M.D.

Starkoff, O. The Placental Transmission of Trypanosoma Brucei (Sulla trasmissione placentare di *trypanosoma brucei*). *Spettacolo* 1949, 127.

The possibility of a congenital infection in different kinds of animals and even in human beings by various species of trypanosomas has been claimed in spite of conflicting experimental results. According to the results of Starkoff, the infection of a pregnant guinea pig was not followed by a transplacental infection of the fetuses. No microscopic lesions were found in the villi in spite of trypanosoma laden maternal blood in the intervillous spaces. On the other hand, an intra uterine trypanosomiasis

occurred constantly after a mechanical injury to the placenta as for instance after a needle puncture through the uterine wall. The infection was limited to the fetuses corresponding to the injured placenta; the others born from the same uterus did not show any trypanosomas in their blood and the inoculation in rats was completely negative.

A transplacental passage of trypanosomas sometimes occurred following maternal asphyxia. 4 of 14 fetuses were found to be affected by disease in this way.

The vascular changes in the placenta determined by histamine also favor the transmission of the disease. An intra uterine infection was observed in 3 of 16 fetuses after a few daily end peritoneal injections of histamine.

It seems highly probable that the congenital infection observed in different kinds of animals and with different species of trypanosomas is not due to specific lesions in the placenta. Anomic conditions of the mother and vascular disturbances due to histamine or histamine like substances and certain other factors favor the transmission of the disease.

EMANUELE MOMIGLIANO, M.D.

GENITO-URINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Dati, T Masculinizing Tumor of the Left Suprarenal Gland with Metastases in the Liver and the Aortic Lymph Glands (Tumore virilizzante della capsula surrenale sinistra con metastasi epatiche e delle linfogiangiande lombo-aortiche) *Policlin*, Rome, 1941, 48 sez chir 133

Dati classifies suprarenal tumors and presents a detailed report of a masculinizing tumor which came under his observation

A twenty-nine-year-old unmarried woman entered the clinic complaining of amenorrhea since 1936, hirsutism, diffuse pain throughout the abdomen, edema, asthenia, nausea, vomiting, hot flashes, a tendency toward depression, and a moderate polyuria. The patient had been in good health until August, 1936, when there was a cessation of the menses, unaccompanied by symptoms. Soon thereafter a light growth of hair appeared on the cheeks and chin and extended subsequently over the chest, shoulders, and extremities, becoming progressively more marked. At the calculated menstrual period, the patient began to complain of slight pains over the abdomen, without special character or localization, unassociated with vomiting or elevation of the temperature. In November of the same year she was seized with severe nausea, vomiting, and sudden pain in the epigastrium with radiation to the right hypochondrium and to the corresponding shoulder. The pain continued without interruption for five days and disappeared after the onset of a profuse vaginal discharge, which became dark red in color and was partly made up of clots. The pain recurred later when it was felt diffusely throughout the abdomen with radiation to the lumbar region. Subsequently there developed also an inconstant morning edema, restricted to the face, the lower quadrants of the abdomen, and the lower extremities, marked asthenia, dyspnea on slight exertion, hot flashes, alteration of the quality of the voice, a well defined change of personality characterized by depression with fleeting occipital headaches, and a moderate polyuria.

Positive findings obtained on physical examination included numerous areas of wine-red pigmentation, the size of a lentil and covered with black hairs, marked hirsutism with male distribution, and moderate edema over the sacrum and lower extremities. Auscultation of the chest revealed diminution of the breath sounds over the lower half of the left thorax, with a few subcrepitant rales at the right base. The second heart sound was slightly accented over the aortic area, the rate and rhythm were normal, and the blood pressure was 182/140. The abdomen was moderately distended and the umbilicus was flattened. In the right lower quadrant an ovoid, smooth, extremely tender mass was easily palpated, it seemed to be about the size of a turkey

egg. There was no evidence of fluid in the peritoneal cavity. On percussion the upper margin of the liver was found to extend at the fifth rib to the mid-clavicular line, while the lower edge was found to extend four fingers below the costal margin. The liver substance was firm, smooth, and tender to palpation. The lower pole of the spleen could be felt close to the midline and appeared to be continuous with a spherical tumefaction which extended down to the iliac spines. The external genitalia were normal except for the exaggerated development of the clitoris.

The urine was clear. The red blood cell count was 4,100,000, and the hemoglobin was 110 per cent, with a color index of 1.1. The white blood cell count was 18,800 with polymorphonuclear leucocytes amounting to 92 per cent. Liver function tests were within the upper range of normal. The concentration and dilution test was normal. The administration of adrenalin caused no diminution of the splenic volume. Skull roentgenograms were normal. Roentgenological examination of the gastro-intestinal tract showed a filling defect of the greater curvature, evidently from extrinsic pressure, displacement to the right of the jejunal loops, and displacement anteriorly of the splenic flexure and descending colon as seen in the lateral view. Urography revealed the pelvis of the right kidney at the level of the sacrum and pushed toward the midline, while the lower calyces of the left kidney were markedly attenuated and the superior one was not visualized.

Laparotomy was performed and a large retroperitoneal tumor was found. This tumor had separated the layers of the descending mesocolon and appeared to be about as large as the head of an adult person. Removal of the mass was rendered impossible by the dense adhesions which surrounded it as well as by its proximity to the great vessels, and it was decided to leave the incision open to facilitate irradiation. On the succeeding day, however, the patient died.

At autopsy the tumor was found to weigh 1,830 gm. It was heavily encapsulated and the surface was grooved with numerous blood vessels. The cut surface was brownish, with zones which indicated old or recent hemorrhages. The pelvic location of the right kidney proved to be due to a congenitally shortened ureter. Superior to it and adherent was a dark gray mass of irregular appearance and fibrous consistency which traversed the inferior vena cava and impinged upon the right suprarenal gland. The aortic lymph glands were markedly enlarged and showed, on histological examination, the same characteristics as the parent tumor. The ovaries were involuted. The right suprarenal gland presented a normal appearance on microscopic section, the left one was entirely replaced by the tumor. The liver contained metastatic growths.

The author concludes his report with a discussion of the relation of the clinical picture to the findings
EDITH FAENSWORTH M D

Heindelberg T The So Called Spontaneous Perforation of the Kidney Pelvis (Ueber die spon-
tane Nierenbecke perforation) *Zeitsch f*
Urol 1941 84 539

After a brief survey of previous publications on perforation of the kidney pelvis most of which fol-
lowed traumatism Heindelberg reports the following case

A woman of thirty four who previously had suf-
fered a rather mild attack of what was interpreted
as an infection of the right kidney with salpingitis
was admitted to the District Hospital Vasteras
severely ill with pain in the right lumbar region al-
buminuria and hematuria Intravenous pyelog-
raphy showed normal findings on the left side On
the right side the pelvis appeared plump and after
35 minutes there appeared an irregularly formed
shadow medially from the kidney about 1 finger
long 1 1/2 fingers wide with blurred contour This
shadow was thought to be either a perforation or an
unusually widened ureter Upon operation under
spinal anesthesia a cavity was found behind the
left kidney which was filled with an ammoniacal
malodorous fluid Nephrectomy and ureterectomy
was done The recovery was uneventful The speci-
men showed a perforation of the kidney pelvis on
the posterior wall Close to it there was a nodule
the size of a hemp grain There was marked pyel-
onephritis Histologically ulceration of the kidney
pelvis was found and the diagnosis of a urinary
phlegmon originating from a decubital ulcer of the
renal pelvis from renal calculus was made

A woman aged thirty three with osteomyelitis
and amputation of the left femur and with a history

of ulcers of the stomach was admitted for colicky
pains in the left lumbar region She was in fairly
good general condition with slight hematuria and
pyuria and moderate tenderness in the region of the
left kidney The flat plate was insignificant In-
travenous pyelography showed a normal right side
The left pelvis was slightly dilated and the calyces
were plump The contrast dye surrounded the left
lower pole and formed a pool medially from it On
the ureteropelvic junction there was a defect of the
size of a hazelnut in the filling The roentgen diag-
nosis was perforation of the renal pelvis with cal-
culus of the size of a hazelnut Cystoscopy ureteral
catheterization and retrograde pyelography corrob-
rated the diagnosis

On operation a hydronephrotic and thinned pelvis
was found but no perforation and no calculus
Nephrectomy was done and recovery was fairly
good The specimen showed no perforation until
the ureter and pelvis were inflated with air Then a
small perforation of the lower calyx was demon-
strated No stone or tumor was found Histologi-
cally small blood accumulations and edema of the
pelvis and ureter were found Heindelberg believes
that this was a case of intermittent hydronephrosis
with perforation

In the first case the diagnosis was made certain
chiefly on the basis of the findings of intravenous
pyelography This examination should be done be-
fore instrumental urography as in the latter method
contrast dye outside of the pelvis or ureter may have
escaped due to the injection pressure and not
through a preformed leak The author's case prob-
ably is the second in the world literature in which the
diagnosis of perforation of the renal pelvis was ma-
terially aided by intravenous pyelography

HERMANN LAMM M D

Nyström T G Malignant Tumors of the Kidney
in Children (Ueber maligne Nierentumoren bei
Kindern) *Zeitsch f Urol* 1941 84 537

After reporting 4 cases of malignant kidney tumors
in children Nyström discusses the clinical factors
pathogenesis and pathology of these tumors

Although rare they occur in about 4 or 5 cases
among 10,000 admissions or autopsies They are of
some clinical importance as about 20 per cent of all
malignant tumors in children are kidney tumors
while only about 0.5 per cent of the malignancies in
adults are the so called Grawitz tumors Due to
the fact that in children the tumors remain en-
capsulated for a long time hematuria is not the
most important sign which it is in adults A palpable tu-
mor is often the first sign While cystoscopy and
urography are not very important in children for
the diagnosis of the tumor itself they are necessary
to prove the presence or absence of the other kidney
The prognosis is rather poor Five year cures are
obtained only in from 5 to 10 per cent of the cases
Local recurrence is frequent While Amer can work-
ers advise pre-operative and postoperative radio-
therapy the German discourage its use



Fig 1 Case 1 right kidney fifty minutes after the injec-
tion of diodast

As to the pathogenesis, there is no generally accepted theory concerning the mother tissue of these tumors, and so far they should be classified as embryonal, malignant mixed tumors. They are neither typical carcinomas nor sarcomas, and the term "adenosarcoma" should be abolished.

Macroscopically, these tumors are knobby, elastically fluctuant, and surrounded by a tough capsule, they push the kidney and pelvis aside, or the kidney sits on the tumors like a cap. They contain cysts and necrotic areas. The cysts contain a jelly-like mass without bacteria or cells.

Histologically they consist of alveolarly built structures, containing very many cells, and separated one from the other by tissue poor in cells. Mitoses are frequent. There is no distinct nuclear polymorphism. There are gland-like structures, surrounded by sarcoma-like strands of tissue. These are responsible for the name "adenosarcoma" which is morphologically correct, but probably wrong pathogenetically.

HEINRICH LAMM, M.D.

BLADDER, URETHRA, AND PENIS

Beach, E. W. Peyronie's Disease or Fibrous Cavernosis, Some Observations. *California & West Med.*, 1941, 55, 7.

Peyronie's disease, fibrous cavernosis or plastic induration of the penis, denotes an abnormal fibrous thickening or fibroma elaboration limited to the tissues over the dorsum of the penis. The septum or sheaths of the corpora cavernosa are involved, with extension of the thickening in an asymmetrical manner into the tunica albuginea. The unique character and unequal distribution of this fibrous change causes painful angulation or deformity in the erect penis, so that coitus is difficult or impossible.

The recognition of fibrous cavernosis is important. Perhaps no obvious lesion (leastwise not in the urological realm) constitutes a greater stumbling block for the general practitioner, and certainly none is more often missed by him. Few diseases have a greater psychic significance and in none is the mental anguish more genuine. No form of therapy is currently entirely satisfactory.

A few of the more common synonyms are Peyronie's disease, Van Buren's disease, plastic induration of the penis, fibrosclerotic plaque, indurated plaque, enchondroma, fibrosclerosis, nodes, ganglia, plastic concretions, and fibrous tumor of the corpora cavernosa.

Peyronie's disease is no respecter of persons, but attacks men in all walks of life with equal facility. The most common age of the patients is between fifty and sixty years, but the condition also occurs quite frequently in the seventh decade. Occasionally, much younger men are afflicted.

The symptoms are rather consonant to the degree of involvement. Pain, which is experienced only when the penis is turgid, may discourage or actually preclude coitus. The erect organ may bend upward (when maximum involvement is at the base) or be angulated to one side (always in the direction of the

greatest pathological change because of resultant segmental inelasticity) in such a manner as to hinder or technically prevent intromission. Examination of the penis discloses a palpable thickening limited usually to the dorsum. This thickening may be most conspicuous in the midline along the septum and advance in a linear manner over the sagittal plane of the penis, only to spread laterally in an unequal fashion across the sheaths of the corpora.

The findings in 3 operative cases were nearly identical with variance only as to distribution. In each instance, a pearl-gray, glistening scarlike tissue of unbelievable density was molded heterogeneously and almost inseparably over the septum and dorsal aspects of the tunica albuginea. At divers points, this tissue, with rather a striated appearance, was concentrated into mounds, heaps, or nodules. Extirpation was difficult, and the knife blade rasped harshly over the cut surface. Histological sections revealed a cellular architecture not unlike hard fibroma, i.e., compact bundles of connective tissue with a paucity of cellular elements.

The author has seen no tangible or physical evidence of benefit from either sodium-gold thiosulfate or potassium iodide, although cures have been reported following the use of the latter.

While the action and usefulness of medical diathermy may be questioned somatically, it has demonstrable merit psychically and especially with the more intelligent patient. Treatments may be given in the office or, better, as advocated by Wesson, a telatherm or small diathermy machine (so adjusted that no burn or harm can occur and equipped with a special penile electrode) may be given the patient for use *ad libitum* in his home.

Radium element, properly screened, was used for an average of 180 mgm. hours. The exact dosage, the number of applications, and the region treated were conditioned by the pathological change at hand. X-ray therapy was similarly regulated, and exposure with a standard 200,000-volt apparatus usually equaled one-third of an erythema dose for five treatments at five-day intervals.

Operation should be reserved for the more adamant and difficult case. The patient should be apprised of possible sequelae. Plastic concepts should be closely followed, and the incision made accordion-pleated, rather than linear, to obviate recurrent scar formation. For the same reason, adroit handling of the tunica albuginea is expedient. Results depend upon the skill of the surgeon and his knowledge of plastic technique.

JOHN A. LOEF, M.D.

GENITAL ORGANS

Fialho, A. A Case of Tumor of Leydig's Cells, with a Discussion of the Known Cases of Hyperplasia of the Interstitial Gland of the Testicle (Sobre um caso de tumor de células de Leydig. Considerações sobre os casos de hiperplasia da glandula intersticial do testiculo). *Rev. brasil de cirurg.*, 1941, 10, 9.

The specimen of tumor on which this article is based was taken from a man forty-four years of age.

The tumor seemed to have had no effect on his general health or his endocrine functions. It was in the lower half of the testicle and occupied about a third of the organ. It was surrounded by a fibrous capsule and was made up of a solid nucleus and a peripheral vacuolized part.

Microscopic examination did not show any signs of malignancy. The cell contained a large amount of lipid. They showed a very great resemblance to the cells of the suprarenal cortex. Only a small amount of pigment was present and no crystals could be demonstrated. The author believes that the tumor originated in the interstitial cell of the testis.

In a work on the anatomy of the male sexual organs published in 1850 Leydig first described these cells and they are therefore known as Leydig cells. The first authentic case of tumor originating in them was published by Chevassu in 1906. This case makes the twelfth authentic case that has been published. Several other cases have been published under this name but careful examination has shown that they were not authentic. These tumors are generally benign. Only 1 of the 12 had definitely undergone malignant degeneration.

The comparative anatomy is discussed and cases in animals are described. A number of cases of hyperplasia of the interstitial cells have been seen in retrogression of the testis in old age, in pseudohermaphroditism in cryptorchidism and atrophy of the testis. The article is profusely illustrated with photomicrographs. *Ann. N.Y. Acad. Sci.* 48: 1-10, 1946.

MISCELLANEOUS

Hammond T. E. Genital Tuberculosis in the Male. *Brit. J. Urol.* 19: 13-43.

The mode of onset of genital tuberculosis and the method of spread is still in doubt. We should therefore keep an open mind.

The diagnosis is at times difficult.

It is essential that the patient be regarded as a tuberculous subject. If good results are to be obtained, salpingectomy treatment is necessary as in other forms of tuberculous disease. Any operation that is carried out is just part of the treatment.

Whereas the operation of epididymectomy is recommended by most surgeons with at times epididymectomy of the opposite side it is doubtful if their results are better than those that follow treatment in a sanatorium with division of the vas.

Orchiectomy should be performed if the disease does not subside. The testis removed by the author in the last three years were studied. Little good would have resulted in leaving them. In there were abscesses of the body and in the disease had extended into the body and in the body was small and had probably atrophied.

If there is to be an advance in our knowledge of genital tuberculosis there must be a closer study of the individual case for the outlook is dependent on many outside factors. The urologists were con-

fronted with the problem of urinary tuberculosis fifty years ago and their one wish was to see into the bladder. The electric light had come in and it was not long before the introduction of the cystoscope enabled them to make use of it. Later they were able to separate the urine of each kidney and to inject up into the ureter substances opaque to the x-ray. Then drugs were introduced which when injected intravenously were excreted by the kidney and made the urinary channels opaque to the x-rays. They have enabled the diagnosis of urinary tuberculosis to become exact and the treatment to be as certain as is possible in tuberculous disease. The author states that so far it has not been possible to catheterize the vas deferens a matter of routine and that most surgeons have done it occasionally though they have had to admit that there is always an element of luck. The testes then are secretory and not excretory and even if catheterization were possible the flow of the secretion might not go on all of the time.

JOHN A. LOE, M.D.

Ross M. E. The Intestinal Granuloma Inguinale. *J. Nat. Med.* 34: 33-5.

The author arrives at the following conclusions in this article on granuloma inguinale.

The primary sore of granuloma inguinale resembles a furuncle which later develops into an ulcer.

The incubation period is about two weeks.

Tartar emetic and iodoquin are the drugs of choice in the treatment of granuloma inguinale.

Sulfanilamide and its derivatives have some beneficial effect on the secondary infection.

The disease involves any part of the body except the scalp.

Since the cervix uteri has been infected the disease must be classified as venereal.

No form of irradiation should be employed until experimental study has shed more light on its effect.

JOHN A. LOE, M.D.

Young H. H., Hill J. H., Jewett H. J. and Stettin R. W. Sulfacetamide Toxicity and Efficacy in Gonorrhea and Urinary Tract Infection. Preliminary Report. *J. Urol.* 45: 9-13.

A preliminary report on the action of p-aminosulfonylethyl acetamide or sulfacetamide both in vitro and in vivo is presented. In the in vitro studies at the level of the bacterial population used the results with sulfacetamide generally were more striking than those with parallel concentrations of sulfanilamide in the case of staphylococcus aureus, gamma streptococcus fecalis, escherichia aerobacter and protos.

The toxic reactions from sulfacetamide in a case of acute venereal disease of 105 cases were as follows:

1. There were 3 toxic reactions, 2 of which were induced intentionally to test the tolerance of the patient to doses of 9 gm or more a day. Of the remaining 4 cases in which no reaction occurred 3 had been treated previously with other sulfon-

mide derivatives, and had had reactions to these drugs. All toxic symptoms due to sulfacetimide disappeared twenty-four hours after the drug was discontinued.

2 In a series of 26 cases in which frequent blood studies were made, 8 (30.7 per cent) had a drop in hemoglobin. The greatest fall was 28 per cent, the average fall in these 8 cases was 17.45 per cent. This depression in the hemoglobin was transitory and in none of these cases was any permanent depressive effect on the hematopoietic system noted.

3 The carbon-dioxide combining power was depressed in almost every instance. In a series of 21 cases in which the carbon-dioxide-combining power was frequently determined, only 1 case showed a normal level of 55 volumes per cent or more. The lowest determination in these 21 cases was 38.1 volumes per cent. No attempt was made to prevent this drop by giving sodium bicarbonate, as has been proved effective with sulfanilamide therapy. This depression in the carbon-dioxide-combining power was transitory.

4 A uniform depression in the action of the enzyme carbonic anhydrase was noted by Cutting Favour who made *in vivo* studies in this series of cases. This, together with the work previously reported by Keilin and Mann, indicates that at least a portion of sulfacetimide is altered in the blood

stream, probably to an unsubstituted sulfonamide compound such as sulfanilamide.

5 A method is presented for detecting in the blood the presence of an unsubstituted sulfonamide group. This test also may serve to establish a different type of clinical acidosis.

6 In 2 cases there was a slight rise in the blood chlorides.

7 No case of leucopenia was observed.

8 There were no cases of urinary suppression.

Among the 29 cases of gonorrhea, 15 (51.6 per cent) which were treated with sulfacetimide are free from symptoms, and multiple prostatic and urethral cultures have been negative. None of these patients, however, has been followed three months, a period which is generally accepted as necessary before ultimate cure is proved.

Among 15 cases of urinary-tract infection (escherichia, aerobacter, and 1 mixed infection including proteus) sterile urine cultures were obtained in 7 instances.

With doses of 4 gm. a day, which were used in nearly all of the cases of this series, the patients were free from headaches and general malaise.

A dose in excess of 6 gm. a day usually is followed by some reaction. The efficacy of the drug does not appear to be increased with larger doses.

JOHN A. LOEF, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES JOINTS MUSCLES TENDONS ETC

Nathanson L. and Cohen W. A Statistical and Roentgen Analysis of 200 Cases of Bone and Joint Tuberculosis. *Rad. et gy.* 1941 35 55

The roentgen appearance of bone and joint tuberculosis has varied in so many instances from the commonly accepted criteria that the roentgen diagnosis is often difficult and inconclusive. A knowledge of the clinical course and general condition of the patient is indispensable in arriving at an accurate interpretation and histological studies may be the only means of reaching a positive diagnosis.

The authors have analyzed 200 cases of verified bone and joint tuberculosis (100 pediatric up to 16 years of age and 100 adult). Seventy per cent of the children were under ten years of age and 77 per cent of the adults were between sixteen and forty-five years of age. The spinal column was involved to a much greater extent than any other area. The upper thoracic spine was much more frequently involved in the children. The lower thoracic spine was more frequently involved in the adults. Skipped involvement of the vertebral bodies was not uncommon. Thirty-five per cent of the children and 28 per cent of the adults showed involvement of more than one area. 42 per cent of the former and 55 per cent of the latter showed some form of pulmonary tuberculous infiltration. Other complications were pleural effusions, genito-urinary tuberculosis, tuberculous peritonitis, tuberculous meningitis and amyloidosis.

Paravertebral abscess was demonstrated in 28 of the 57 spine cases. The abscess may be the only roentgen evidence of underlying bone disease. Skipped infections of vertebral bodies may be due to the extension of a paravertebral abscess in addition to multiple embolic foci. The vertebral body may be primarily involved in its anterior, central, posterior or marginal areas. The small parts of the vertebrae are infrequently involved. Marginal involvement occurs most frequently in adults and is usually associated with narrowing of the intervertebral disc. Posterior involvement is more frequently associated with clinical evidence of cord involvement than lesions producing marked collapse of the vertebral bodies with kyphosis.

Tuberculosis of the primary shaft is relatively uncommon in children but involvement of the short tubular bones is frequent. The roentgen appearance is not typical but may resemble chronic nonspecific osteomyelitis with productive and destructive changes and overlying periostitis. In flat bones the tuberculous lesion appears as punched-out areas. Such areas were also observed in the shafts of long bones immediately adjacent to tuberculosis of the shoulder, knee, ankle and elbow. Bilateral symmetrical lesions indicating hematogenous involvement were observed.

The authors conclude that since bone and joint tuberculosis may resemble so many other conditions, its diagnosis should not be attempted from the roentgenogram without a detailed knowledge of all the clinical facts pertaining to each individual case.

DANIEL H. LEVENTHAL, M.D.

Urban V. A Follow-up Study of the Effects of Vertebral Osteosynthesis in the Treatment of Tuberculous Spondylitis. (L. roentes y tuberculopospondylitis y su efecto en la distorsión de la columna) *Arch. f. d. Ch.* 1940 38 416

Vertebral osteosynthesis is the contribution of modern surgery to the problem of eradicating tuberculous spondylitis and correcting or stabilizing the deformity of the spine. The author reviews the literature and notes that in 1911 Albee for the first time performed vertebral osteosynthesis with an inlay from the tibia. At the same time Hibbs brought forth his operation for the same condition. At the Italian Red Cross Hospital of Valdoctra 132 vertebral osteosyntheses were performed in the period from 1928 to 1937 by the method of Albee or Hibbs. After operation the spine was immobilized from nine to twelve months. Surgery was done anywhere from five months to one year after the onset of symptoms.

Conservative management is necessary in the early acute stage which is probably associated with an intense bacillæmia. After the acute stage has subsided the purpose of surgery is to assure the greatest immobility possible to the tuberculous vertebra by the support of the bone graft.

The author has in this manner treated patients between the ages of 31 and forty years. He considers the coexistence of multiple tuberculous lesions, febrile disease, fistulas, abscess and paraplegia as complications.

A successful osteosynthesis does not necessarily mean cure of the tuberculous focus in the spine. In most cases the destructive lesions gradually diminished in size.

The author presents a detailed tabulated analysis of his follow-up cases. Fifty of the 132 cases studied since 1937 showed excellent results. The results encourage further attempts to arrest the tuberculous focus and prevent deformity.

J. COB E. KLEIN, M.D.

Sundelin F. Gold Therapy in Chronic Arthritis with Special Consideration of the Complications. (Die Goldtherapie bei chronischer Arthritis mit besonderer Berücksichtigung der Komplikationen) *Acta Med. Scand.* 1941 5 pp. 7

The bactericidal effect of gold salts was demonstrated *in vitro* by Robert Koch in 1890. Behring showed that the failure of the bactericidal action of gold salts *in vivo* was due to the effect of the blood

serum (1890-1893) After a great deal of clinical and experimental research had been performed by various workers, Feldt (1927) succeeded in producing a gold salt, which he called "solganol" This proved to be effective not only in combating recurrent infections in mice but was also almost specific in the treatment of spirochetal as well as streptococcal infections in mice Encouraged by these reports other workers tried the effects of "solganol" in other diseases both in experimental animals as well as clinically

Thus Lande and Pick appear to be the first to have systematically studied the therapeutic action of gold preparations in chronic polyarthritis Forester (1929) and many others have since reported the successful employment of various preparations of gold salts After an extensive study of the literature the author finds that gold therapy in chronic polyarthritis is used in many countries In spite of the fact that its use is accompanied by many and sometimes fatal complications, gold therapy is considered by some as indispensable to the armamentarium of the therapy of chronic arthritis It is only in recent years that increased interest in this form of therapy has been evidenced in the United States

To sanocrysin and solganol, the most commonly used preparations, have been added many different preparations Each of these represents a different gold-salt combination and they vary in their gold content from 9 to 64 per cent Some are water soluble, some fat soluble, and others are insoluble in both fat and water However, they all contain sulfur in some form The dosage depends upon the severity of the disease as well as upon the nature of the reaction of the individual, which must be carefully determined in each case

After a review of the literature it would seem that the many different gold preparations, both of organic and inorganic salts, have the same toxicity The question as to whether the various gold salts exert their action by a direct effect upon the bacteria or whether they raise the systemic resistance of the patient has not yet been clearly answered Many workers have shown that the gold substance is absorbed by the reticulo endothelial system and may be retained indefinitely in practically all the tissues of the body In the human being, retention of gold salts is greatest in the spleen, kidneys, liver, lungs, heart, brain, and lymph nodes, in the order named

Insoluble gold salts may remain at the site of injection for many weeks Elimination is generally extremely slow and protracted, and takes place chiefly through the kidneys and intestinal tract

Subsequent workers have been unable to substantiate the theory of Mollygaard and others that gold salts have a bactericidal action *in vivo* It has been adequately demonstrated that in order to exert such an action the gold salts would have to be administered in doses far beyond the lethal limits A review of the literature would indicate that the reticulo endothelial system is stimulated by small doses of gold salts The activated reticulo-endothelial cells are supposed to convey the therapeutic

agent to the foci of infection Larger doses, however, apart from their toxic effects, may have a stimulating action on bacterial growth The author believes that no conclusions can be drawn from the available literature

Results of therapy After studying some 3,800 cases reported in the literature by various workers the author finds the percentage of "cures" ranging between 40 and 95 per cent These results are by no means unconditionally acceptable because they are not based on uniform criteria nor even on comparable clinical material Most authors, however, agree that the results of gold therapy are obviously so good that it should be used in spite of the almost certain, and by no means inconsequential, disadvantages and dangers which this form of therapy entails

Reactions and complications The significance of the reactions and complications attending gold therapy may be judged by the fact that the author devotes two entire chapters of about 75 pages to their discussion Reactions may be classified under two types focal and general Thus in pulmonary tuberculosis a focal reaction may assert itself in the form of increased expectoration whereas in chronic polyarthritis local signs and symptoms may become aggravated Generalized reactions may consist of chills, transient or recurrent fever, malaise, or increased sedimentation time, and these reactions are very frequently the forerunners of severe complications

Complications The most common complication is some form of "aurides" or gold exanthem which may vary in extent and severity Chrysocyanosis, or skin pigmentation following gold therapy is a frequent complication This may be general or limited to the exposed portions of the body and is usually temporary

The "aurides" localizing on the mucous membranes may assume various forms and degrees of gingivitis and ulcerative stomatitis

Gastro-intestinal complications may vary from transient vomiting and diarrhea to fatal ulcerative colitis Gastro-intestinal complications were more frequent and of greater severity in the early days of gold therapy at which time large doses were employed

After reviewing the literature the author concludes that mild types of liver damage are occasionally observed while severe liver damage appears to be extremely rare The connection between gold therapy and liver damage has as yet not been satisfactorily explained

Gold salt therapy is capable of causing disturbances in every type of kidney function These disturbances are, as a rule, benign and transient However, occasionally the kidney damage may assume great severity and even end fatally

Pulmonary complications are reported in the literature in the form of bronchitis, tracheitis, and even bronchopneumonia Snyder *et al* (1937) reported a case of acute edema of the larynx requiring trache-

otomv Cardiac complications are unusual. Complications involving the nervous system are extremely pleomorphic. Although the literature is rplete with reports of complications of the nervous system the data presented is so incomplete that it is impossible to draw any definite conclusions. In addition to conjunctivitis keratitis and other local effects on the eye gold therapy may result in damage to the organs of sight hearing and taste because of injury to the different cranial nerves.

Numerous publications call attention to the deleterious effect of gold therapy upon the blood-forming organs as well as upon the morphological and chemical composition of the blood itself. After a comprehensive review of the literature the author presents the results of his findings in tabular form. Agranulocytosis and hemorrhagic purpura with thrombocytopenia are among the most frequent complications mentioned in the literature.

The frequency of complications has been reported as being anywhere from 1 to 77 per cent by different authors. The statistics presented in the literature do not justify any conclusions as to the frequency and distribution of complications following the use of gold preparations. The genesis and nature of the complications have not as yet been clarified. Some authors believe that there is some relationship between the occurrence of some form of complication particularly exanthemas and distinct improvement in the condition treated. This is thought to occur in chronic polyarthritis and asthma but not in tuberculosis.

Prophylactic measures to prevent complications in gold therapy concern chiefly the determination of dosage and proper spacing of the intervals between injections. These measures however as have already been shown are incapable of preventing complications entirely.

The second half of the monograph is devoted to the author's own researches and clinical material. The latter consists of 730 cases of chronic inflammatory arthritis treated with gold during the years from 1934 to 1940. The material included 577 cases (171 males and 406 females) of primary chronic inflammatory arthritis (atrophic arthritis, rheumatoid arthritis), and 99 cases (37 male, 62 females) of chronic arthritis of definite origin, viz. rheumatoid fever, gonorrhea and other acute infectious diseases. The author's method of treatment and clinical results are presented in great detail. Individual cases are reported and many tables summarize the results. A comparison between the author's results and observations and those found in the literature is difficult. However, the author believes that the immediate results of gold therapy in chronic infectious arthritis were surprisingly good. Nevertheless, a factual evaluation of this therapy taking into consideration both its advantage and disadvantages cannot be rendered at the present time. It will require several years before the present follow-up studies can be completed.

H. R. Y. A. S. LEMANN, M.D.

King, E. S. J. Malignant Tumors of the Tendon Sheaths. *Int J Surg* 1944; 2: 338.

Tumors of the tendon sheaths are not uncommon but the malignant variety has been reported on relatively few occasions. This seems to be due in part at least to lack of recognition of the specific nature of these growths. Although truly sarcomatous they are sufficiently characteristic to be segregated from other forms of connective tissue neoplasms. The characteristics which so differentiate them are the presence of synovial spaces and of mucoid material between the cells.

From the study of 7 malignant tumors of the tendon sheaths described by the author he proposes the following classification:

Synovial sarcoma

A. Synovial forms

- (1) Typical synovial type. This contains synovial spaces and the cells are usually but not invariably spindle in form.
- (2) Mucoid type. The mucoid material is intercellular in position and varies greatly in amount; the cells are predominantly but not invariably spheroidal in form.

The two types may be found associated in the one tumor.

B. Indifferent forms

- (1) Fibrosarcoma found in recurrent and metastatic growths.
- (2) Reticular sarcoma occurring in the present cases only in parts of the tumors.

All of the tumors described by the author were of the differentiated synovial forms and synovial spaces constituted a characteristic component of most of the tumors examined. They were found easily in 4 and in a portion of the fifth of the 7 cases. They varied considerably in form but always showed a close morphological similarity to either normal or some abnormal form of synovial membrane.

The most easily recognizable spaces are those in which the lining material is very similar to and sometimes identical with the normal membrane. The lining is typically connective tissue, containing spindle or regular cells which are embedded in the tissue but which in some places appear on the surface. Such tissues differ considerably in the degree of cellularity and sometimes cells may line the surface almost throughout a section and thus give an endothelial appearance.

The interstitial tissue occurs in three main forms.

Mucoid material occurs most characteristically in relationship to spindle cells. The amount varies greatly from a very small scarcely recognizable quantity to a large collection between groups of cells which may resemble the distal portion of such material as ganglia. Less commonly this material is associated with spindle cells and occasionally there may be an ordinary mucoid connective tissue. Fibrous connective tissue is usually associated with spindle cells. The amount of this material varies

greatly and appearances ranging from that of a soft fibroma to that of an anaplastic fibrosarcoma are to be found

A history of injury, usually a "strain," followed almost immediately by a "lump," is often given. The sudden onset of pain and its gradual subsidence suggest that there has been a tearing of some tissue fibers and hemorrhage. This swelling persists, although there may be some variation in size. Then ensues a latent period, sometimes of several years' duration. Very slow growth may occur during this time. A new phase then ensues in which the tumor begins to grow and to invade the neighboring tissues. This stage is sometimes initiated by another injury, possibly including that of operation. It is more usual, however, for the mass to have begun to enlarge before treatment is sought, in which case the malignant features cannot be attributed to the trauma of operation. In some cases the growth may be obviously malignant from the outset. Any swelling on a tendon sheath on the volar aspect of the wrist should suggest a malignant tumor.

The treatment of these tumors is very unsatisfactory. The treatment of choice is a reasonably wide excision with radium implantation in early cases, and, if removal of the lymph nodes is not performed, the region must be observed with particular care. In so far as these growths spread in the early stages by way of the lymphatic vessels or tissue planes rather than the blood stream—as do the osteogenic sarcomas or the rhabdomyomas—they are more susceptible to surgical treatment than are the other malignant tumors.

The 7 cases studied are presented in detail and are accompanied by photomicrographs.

ROBERT P. MONTGOMERY, M.D.

Giangrasso, G. Experimental Peritendon Plastic with Rubber Sheets (Plastiche peritendinee sperimentali con lamina di gomma). *Ann. ital. di chir.*, 1940, 19: 756.

Rubber sheets were introduced in war surgery by Delbet in 1915 and were successively adopted as plastic material by numerous French and Italian surgeons. This is now an experimental contribution to the clinical work.

Three drops of an attenuated staphylococcus aureus culture were injected into the Achilles peritendon of rabbits. Phlegmonous inflammation of the tendon sheath developed with a secondary pus collection. This was opened and drained completely. The resulting scar fused the tendon with the neighboring tissues. Six months later the scar was excised and the tendon dissected free, this was wrapped in a rubber sheet, rolled as a cigaret paper, and fixed at the two ends with catgut sutures. No inflammatory reaction has followed the use of the plastic material, in every case there is a perfect primary healing of the wound. The microscopic examination has demonstrated the absence of any new adhesion. The rubber sheet actively guided the direction of the proliferation of the connective cells. The regenera-

tion of the tendon sheath was already under way in the first two weeks. The newly formed sheath became more and more loose, the internal surface was lined by stratified cells and formed, here and there, fringes similar to those of a synovial membrane. A perfect functional restitution was constantly obtained from two to three months after the plastic operation. The tendon again glided freely and smoothly in the newly formed sheath.

Therefore, the experimental results of Giangrasso show that rubber sheets constitute a very satisfactory insulation material, better than cellophane, wax or parchment paper. EMANUELE MONGILIANO, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC

Farill, J. Sulfanilamide in Osteo-Articular Surgery (Las sulfanilamidas en la cirugía osteoarticular). *Prensa med. mex.*, 1941, No 7 p. 104.

Of 22 patients with osteo-articular surgical conditions of from thirty-seven days to nineteen years of duration, 18 or 81 per cent, presented healing by first intention after oral administration of sulfathiazole.

In view of the limited effect of sulfanilamide on certain pathogenic bacteria the author prefers sulfamethylthiazole which produces a rapid fall in the temperature, improvement of the general condition, and diminution of suppuration. The treatment is supplemented by local administration of sulfur preparations.

JOSEPH K. VILAT, M.D.

FRACTURES AND DISLOCATIONS

Maróttoli, O. R. Pseudarthrosis of Carpal Scaphoid. Treatment by Bone Graft (Pseudoartrosis del escafoides carpiano. Tratamiento por injerto óseo). *Bol. y trab. Acad. argent. de ciruj.*, 1941, 25: 435.

Among the fractures of the wrist that of the scaphoid is relatively frequent and presents a particular clinical and therapeutic problem. The special circulatory conditions of the bone which receives one vessel at the middle of its dorsal aspect and another at its tuberosity explain its predisposition to post-traumatic necrotic process. In addition nearly its entire surface is covered by cartilage which leaves only a narrow fibroperiosteal strip on its dorsal and palmar aspects and therefore repair of fracture is never by subperiosteal callus but by strictly interfragmental osteogenesis which proceeds very slowly even under appropriate treatment.

Experience has shown that for various reasons such as diagnostic error and insufficiently prolonged immobilization some fractures do not heal by bony repair but result in pseudarthrosis. It is possible that in a recent fracture without displacement the frontal roentgenogram does not show the fracture line which becomes visible two weeks later when the process of marginal bone resorption sets in. It is always advisable to use an oblique exposure and to

repeat the roentgen examination if the disturbances persist one month after the traumatism to the wrist in fact it has been recommended to suspect fracture of the scaphoid in any traumatic case in which the disturbances persist for more than two weeks and pseudarthrosis if the disturbances are localized between the tendons of the extensors of the thumb at the level of the wrist and persist for months or years. A fracture in which bony repair has not occurred undergoes a series of regressive phenomena corresponding largely to the age of the process: these stages must be taken into account when the treatment is considered (delayed union, established pseudarthrosis, aseptic necrosis, terminal deforming arthritis).

Cases of pseudarthrosis of the scaphoid have been reported in which the function of the hand was not impaired and the patient did not even know that he had such a defect. However careful examination nearly always shows that the amplitude of the movements of flexion and extension of the wrist and the prehensile power of the hand are decreased. Usually a case which proceeds to pseudarthrosis remains without major disturbances for a variable time after the accident and subsequently presents disturbances which increase progressively with intervals of remission until their maximum is reached—radiocarpal chronic deforming arthritis.

The treatment of pseudarthrosis of the scaphoid recommended by different authors varies from orthopedic measures to the most radical interventions and includes prolonged immobilization in a plaster cast, perforations under roentgen control, perforations after exposure and curettage of the interline of fracture, bone graft, partial or total excision of the scaphoid. Prolonged immobilization (up to ten months) and perforations are complementary and should only be used in delayed union or in fractures that are a few months old, have not been treated and show no signs of lacunar necrosis. Excision of the scaphoid is recommended by some and condemned by others. Bone grafting was first done in 1928 by Adams and Leonard and the use of the method was spread by the works of Murray and Burnett dating respectively from 1933 and 1937. These two authors use practically the same technique but Burnett insists on the importance of the styloid process of the radius to identify the scaphoid.

With the hand in complete adduction a curved incision is made on the external aspect of the wrist the vasculonervous bundle and the long extensor are retracted which exposes a considerable portion of the scaphoid especially its tuberosity through a preliminary nick a tunnel is bored with a fine drill involving the two fragments but not reaching the semilunar facet and a small graft taken from the tibia is inserted the wound is sutured and the wrist is immobilized for eight weeks. The functional results are excellent. Maróttol reports a personal case which demonstrates the value of the method in pseudarthrosis of long standing: his patient had suffered a violent traumatism of the wrist seven years before the intervention. RICHARD KEMEL, M.D.

Severin F. Congenital Dislocation of the Hip Joint. Late Results of Closed Reduction and Arthrographic Studies of Recurrent Cases. *Acta Orthop Scand* 94:184, 1935.

This article records the results of an investigation which the author began in 1937 at the instigation of his chief surgeon H. Wallenström who at that time was working on a way to improve the treatment for congenital dislocation of the hip. A certain method has been in continuous use at the Orthopedic Clinic in Stockholm ever since its introduction by Haglund. Haglund himself believed that the treatment which was a modification of Lorenz's method would result in a permanent cure in practically all of the unilateral cases and in 60 to 70 per cent of the bilateral ones but the author found from his daily experience that the results were not so good. Therefore he undertook to make a thorough follow-up investigation of the cases of dislocation treated at the hospital mainly in order to determine the amount of anatomical healing obtained. The investigation had not been organized very far before it was plain that the late results of the treatment for dislocation were far from satisfactory.

The article also contains the results of another one of his investigations mainly a study of dislocated hips with the aid of arthrography. The archives of case records and roentgen films date from 1913 when the Orthopedic Clinic in Stockholm was organized. From that time until 1935 every patient with a dislocation of a hip entering the hospital was treated with Haglund's modification of the Lorenz method. Roentgen films of the cases of dislocation (dating from the year 1913) were usually taken both immediately before and after the reduction and during the after treatment. The author does not believe it possible to compare the late results of the treatment now used at the hospital with those of the one used earlier for not enough time has elapsed since the new treatment was introduced. He considers five years the absolute minimum before late results can be judged unless re-dislocation occurs in which case one knows the outcome much earlier. His aim has been to make a complete re-examination including roentgenography.

In all the cases of dislocation treated with primarily successful results at the Orthopedic Clinic in Stockholm during the years from 1913 to 1932 primarily successful treatment means that after which the hip was still reduced at the end of the treatment. The roentgen anatomical results are classified according to the displacement of the acetabulum and femoral head and the position of these parts in relation to one another. Definiteness in the femoral neck were noted separately in each group. Wiberg's CE angle (center of the femoral head edge of the acetabulum) was of great aid in this determination. All the cases were treated according to the same principles with the modification of Lorenz's method as used by Haglund. Apart from the patients who died except 4 who were treated with primarily successful results (making 330 patients).

and 454 treated hips) were submitted to re-examination five to twenty-seven years following the treatment

Re-examination showed the following roentgen-anatomical condition in the hip

| | Per cent |
|--|----------|
| 1 Well developed hips (roentgenologically) | 4 24 |
| 2 Moderate deformity of the femoral head, neck, or acetabulum, but a well formed joint otherwise | 7 14 |
| 3 Dysplasia, not subluxation | 8 04 |
| 4 Subluxation | 43 75 |
| 5 The femoral head in a secondary acetabulum in the upper part of the original one | 12 05 |
| 6 Re dislocation | 16 96 |

Five and fifty-eight hundredths per cent of the patients had died, and 1 34 per cent were not re-examined

Severin's investigation discloses that early dislocation yields the best late results, both in regard to the general roentgenological condition and the condition of the separate articular parts. He agrees with those who believe that the treatment for congenital dislocation of the hip should be begun as early as possible. Re-examination of the original roentgen pictures showed that 57 of the healthy hips in 190 unilateral cases suffered from definite dysplasia or subluxation when the other hip was treated.

The functional results were better than the roentgen-anatomical. A large number of normal subluxated and dislocated hips in children were examined with the aid of arthrography. Cases of dislocation were followed with repeated arthrography up to two and one-half years after the reduction. The author made casts of the hip-joints in the post-mortem specimen. The fixed arthrogram was then dissected out, and comparison made with the roentgen and clinical observations. By this means he found that the cartilaginous acetabulum could be defined in the arthrogram, not only laterally and superiorly by identification of the edge of the limbus, but also medially and inferiorly by the establishment of the site of the transverse ligament. By this method the border lines between a normal subluxated and a dislocated hip can be more sharply defined.

The cases included in the arthrographic study were all treated according to the method which has been used since 1937 at the Orthopedic Clinic in Stockholm. The main features of the method are the following:

The reduction is done as soon as and as gently as possible. The hips are kept in plaster in 90 degrees of flexion and from 60 to 70 degrees of abduction for three or four months. The plaster is always applied to both legs, but only down to the knee joints. The after-treatment, with the legs in abduction and flexion, is extended to two years after the reduction. At first the child is made to lie in this position all the time between the walking exercises, but later only at night or one or two hours during the day.

E. C. ROBITSHEK, M.D.

Cagnoli, H. The Treatment of Fractures of the Femoral Diaphysis, 110 Cases (El tratamiento de las fracturas de la diáfisis femoral, a propósito de 110 casos). *An. Fac. de med. de Montevideo*, 1941, 26 461.

Cagnoli discusses the history of fractures of the femur, the appliances used in transporting the patients, the general problems of the treatment, the general methods employed (including surgical treatment, simple immobilization, and continuous extension), and the techniques favored by various authors. He describes the technique used in the Service of Traumatology.

As soon as roentgen examination has provided the necessary data, the patient is submitted to skeletal traction with the extremity simply resting on the bed or placed in the apparatus of Zuppinger modified by Putti, which is more convenient. This apparatus, which consists of a fixed supporting frame and a mobile double inclined plane, allows exercising traction in the axis of the fractured bone, orienting the traction with the extremity in correlative flexion, placing the distal fragment in the axis of the proximal one and the apparatus in more or less abduction, keeping the foot suspended and thus avoiding equinus and decubitus ulceration of the heel, applying a plaster cast without movement of the patient, and adapting the apparatus easily to the various lengths of the extremities to be treated. Steel wire having a diameter of 1.5 mm and one sharp extremity is used for skeletal traction; it is passed through the bone by means of an electric drill, revolver type, and is guided by Putti's special forceps. Local anesthesia is unnecessary. In more than half of the cases, the wire was passed through the femoral condyles.

In the first cases, the traction was applied through the anterior tuberosity of the tibia, according to the advice of Boehler, but this method was found less effective, besides, it presented the disadvantage of transmitting its force through the joint in which hemarthrosis is frequent, and these two factors must have an unfavorable influence on the future stability of the joint. In addition, there may be other and even severe articular traumatism which remain unrecognized in the presence of the grave picture of the fracture. When the wire has been introduced, an aseptic isolating dressing is applied and the traction stirrup is installed with its cable and the necessary weights from 4 to 5 kgm are used to begin with in children, and from 6 to 8 kgm in adults, because it is better to increase the traction gradually and in accordance with the requirements of the reduction. The foot is then bandaged and suspended to the apparatus.

Daily supervision is necessary, a roentgenogram is taken after three days and repeated at various intervals depending on the rapidity with which the interfragmental diastasis takes place. When overriding has been reduced, other displacements, if any, are corrected and the plaster cast is applied from the upper part of the abdomen to the toes. Care is taken to model the cast well over the iliac

crests the trochanter and the condyles to avoid any possibility of displacement of the fragments. Control roentgen examination follows immediately. On the following day the patient begins to walk, at first he is assisted by a special walking cage which is soon replaced by crutches and then by canes. The first period of immobilization for adults lasts from six to seven weeks the cast is then removed the amount of callus is verified and a second cast is applied from the pelvis to the knee which is left free. To avoid edema of the leg and foot the cast is completed with an Unna bandage reaching to the toes. The necessity of walking must be impressed on the patient. The second cast is removed at the end of six weeks when union is found to be solid. In exceptional cases in which there is still some mobility in the focus of fracture immobilization may have to be prolonged for another three or four weeks.

The author discusses the treatment of open and badly healed fractures and presents the statistical data on the 110 cases treated in the Service of Traumatology. The fracture involved the upper third of the femur in 37 cases the middle third in 60 and the lower third in 12 while in 1 case there was a double fracture separating the middle third. The ages of the patients ranged from three to ninety-five years and 90 per cent of the patients were males. There were 4 open fractures with 2 deaths and 11 badly healed fractures. In 2 cases the fracture was bilateral. Reduction was obtained by skeletal traction in 94 cases and by traction on Schöde's table in 14 while surgical intervention was necessary in 2. Skeletal traction required an average of ten days (minimum three maximum twenty). The number of kilograms needed varied from 4 to 20 with an average of from 10 to 12 in adults and from 6 to 8 in children. It took an average of twenty days before a patient could be sent home and from 5 to seven weeks before the children and from twelve to fourteen weeks in adults before final discharge could be given. The temporary disability estimated at no more than three and a half to four months.

RICHARD KEMEL, M.D.

Inclán A., Tarafa J. I. and Sánchez Toledo P.
The Treatment of Fracture of the Femoral Neck.
(Tratamiento de la fractura del cuello del fémur). *Congreso Iberoamericano de Cirugía*, 1948, 8, 7, 24-35.

Inclán begins this symposium with a thorough discussion of the anatomical, biological, mechanical and pathological problems involved in fracture of the femoral neck.

Tarafa describes the conservative method of treatment and gives their indications. The method of Tillaux is employed when it is impossible to see any other one but even then it should be employed only temporarily. The same applies to the method of Thomas although Tillaux prefers that of Tillaux. Russell's traction is indicated in patients with cardiac or pulmonary complications or nervous disturbances or who are of advanced age and those who

have to be kept in bed but in whom earlier handling is desirable than that allowed by a plaster cast. Whitman's method is used in special cases while protecting the fracture the lightness of the plaster cast permits greater mobility of the patient although the maximal degree of abduction makes walking difficult. Kleinberg's ambulatory plaster cast when the abduction is of average degree makes walking possible and causes penetration of the fragments it is indicated for functional stimulation which favors consolidation. The apparatuses of Thomas, Bradford and Bruns are used when it is desired to make the patient walk without bearing weight on the leg, in pseudarthrosis or incompletely calcified callus. Braun's splint is used temporarily to keep the extremity in correct position with the patient in bed or to obtain a reduction by continuous traction in view of subsequent final treatment.

Sánchez Toledo discusses the surgical treatment and draws the following conclusions from the observation of his cases:

Reduction and surgical intervention must be done as early as possible, one week should be sufficient for the study and the preparation of the case. The author prefers the reduction method of Leadbitter. The nail must be directed toward the upper part of the femoral head and the fracture must remain in slight valgus rotation of the head must be avoided. The valgus position favors secondary displacement. He has not observed a tendency to secondary displacement in subjects below the age of sixty years when the nail is in good position and he does not use immobilization in these cases. In those above the age of sixty the nail is marked tendency to secondary displacement and therefore he takes recourse to immobilization in these cases. If union has not been obtained in less than six months he attaches more importance to the reestablishment of the trabeculae and to their direction than to the increased density of the head. In some of his cases there was union without any shortening of the femoral neck while in others there was slight shortening. In cases of nonunion there have been relatively good function when the nail has not been displaced. Signs of nonunion were observed in the cases in which operation was done the nail was extracted because pseudarthrosis had developed despite the fact that there was perfect union in the other. The nail and the tissue distal to it have any alterations. There have been no deaths although the cases were not selected for operation and peculiar investigations were hardly ever made. Osteomyelitis is the treatment of choice. On the other hand the age of the patient is the type of the fracture of the femoral neck provided that the degree of the major nature is contraindicated any treatment whatever. In the latter cases when the fracture is simple, protected, conservative treatment is employed.

Inclán discusses results and statistics. He has reviewed 8 cases of all fractures of the femoral neck, 53 were recent and 3 were old fractures. The first group of 5 were treated with the Tillaux nail

of Smith-Petersen and 1 each with a nail and a refrigerated autogenous bone graft, the fractures were subcapital in 24 cases, transcervical in 26, and cervicotrochanteric in 3. The average age of the patients was sixty-eight and three-tenths years. Bony union was obtained in 28 and non-union was found in 9, 13 cases were still in progress, the result was unknown in 2, and death had occurred in 1, in addition, 2 later deaths have been reported. 1 from pulmonary tuberculosis and 1 from cardiovascular lesions. In the second group, there were 7 cases of delayed union with signs of partial resorption of the femoral head, and or disturbances of nutrition of the femoral head, and 25 cases of pseudarthrosis occurring from one to five years after the fracture. Various treatments were used with the following results: union with a Smith-Petersen nail in 57.1 per cent, union with a refrigerated autogenous or homologous bone graft in 85.7 per cent, subtrochanteric osteotomy with excellent or good result in 75 per cent, reconstruction of the hip by the Whitman or Albee method with excellent or good result in 71.4 per cent. There were no deaths with the first three methods of treatment, and the mortality for the whole series was 9.3 per cent.

The authors draw the following general conclusions:

- 1 True fractures of the neck of the femur (whether of the subcapital, transcervical, or cervicotrochanteric type), on account of their particular anatomy, physiology, mechanics, and pathology, are to be considered in contradistinction to fractures in the trochanteric region of the femur, because in traumatology they present different features and re-

quire special methods of treatment to improve their bad functional prognosis.

- 2 The present surgical procedures have increased the average of union to 75.6 per cent in the cases reviewed by the authors. Fixation by means of the Smith-Petersen nail is a simple, rapid, and harmless procedure which should be employed in any case of fracture of the femoral neck proper if the patient can be exposed at all to its slight operative risk. The use of the flanged nail associated with a bone graft, preferably in two stages, will diminish considerably the percentage of non-union still observed in the treatment of these fractures.

- 3 As soon as signs of delay in the union are noticed, intracervical osteoplasty should be carried out in order to avoid pseudarthrosis.

- 4 In pseudarthrosis with a viable head or when the head is about to regain its viability, procedures are to be used which aim at the ultimate stage of bony union. The use of an intracervical bone graft alone, or in association with a Smith-Petersen nail, has increased the percentage of bone union to 85 in the present series of cases.

- 5 In case of pseudarthrosis with marked resorption of the femoral neck and necrosis or atrophy of the head, Inclán holds that the reconstruction operations of Whitman and Albee restore good function in 71.4 per cent of all cases when the patients are in good general condition.

- 6 In cases with the same pathological changes, but with a poor general condition rendering the surgical risk too high, especially at an age above sixty, intertrochanteric osteotomy is the method of choice.

RICHARD KEMEL, M.D.

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Rebaudi F and Guardavaccaro G Post Traumatic Aneurysm (Aneurysm post traumatic) *Chir d og id mor ment* 1940 6 53

Traumatic aneurysms have become more numerous since the introduction of small arms. A hematoma forms about the site of injury of the vessel and becomes larger with each pulsation of the artery. The entire mass becomes encapsulated in dense connective tissue. The mass is ovoid in shape and pulsates; the overlying skin is unaltered. Central compression of the artery causes diminution in the size of the tumor and stops the pulsation. According to the location, the local nerves may be compressed and cause secondary nerve symptoms.

Most frequent and most difficult to treat are the aneurysms of the lower limbs, particularly of the femoral arteries. Indications for surgical treatment are the rapid increase in the size of the tumor, the danger of rupture of the aneurysm, and interference with function. When serious symptoms have not developed, the author advises a conservative attitude to permit the development of a collateral circulation. In incomplete injuries of the artery, the wall of the vessel may be satisfactorily sutured. When there is absence of a collateral circulation, great care should be practiced in treating the aneurysm. There is a possibility of gangrene in 30 per cent of the aneurysms of the femoral artery and in 13 per cent of those of the popliteal artery. At the time of intervention, a temporary compression of the aneurysm causes no disturbance in the toes if there is a good collateral circulation. In involvement of the profunda femoris, the author dissects out the arteriovenous block of tissues and extirpates the sac. The ideal treatment is extirpation of the sac followed by repair of the arterial defect. In arteriovenous aneurysm at a dangerous site, the weak area may be sup-



Fig Post traumatic aneurysm before treatment

ported by suture of the neighboring tissues about it as a protection.

The author concludes that these aneurysms are usually progressive in nature, with increasing pain, paralysis, trophic disturbances, edema, and paresthesia. He briefly cites the clinical records of 11 such cases occurring in wounded soldiers. Numerous illustrations clarify the text. JACOB E. KLEIN, M.D.

BLOOD TRANSFUSION

Harrison G A and Pickens L E R Quantitative Aspects of Transfusion Transfusion for Hemorrhage and Wound Shock Dangers of Transfusion Control of Dosage *La cel* 1941 24 685

The normal plasma volume and red blood cell volume are each about 5 per cent of the body weight. The loss by hemorrhage of three pints of plasma and three pints of cells would be a very severe one. This would necessitate the replacement of 110 gm of plasma protein as 3.4 pints of filtered serum, 5.1 pints of citrated plasma, 8 pints of citrated whole blood, 6.6 pints of defibrinated whole blood—which would be the maximum quantity to be used in severe hemorrhage. Most cases would require less.

In wound shock, the authors recommend one pint of serum or plasma to be followed by another if the loss of blood is probably greater than 2 pints. After the patient has recovered from shock, subsequent treatment should include whole blood.

The danger of too much blood or more commonly serum is the production of a pulmonary edema. The use of various methods, such as that of Hill for estimation of the plasma volume or blood volume, is too slow; it is inaccurate and cumbersome in emergency. The use of pulse rate, hemoglobin, red-cell count, and hematocrit are helpful. The authors believe, however, that the replacement of the estimated protein lost is the simplest and safest guide. The following table gives in grams the amount of protein per 100 cc. of transfused medium.

| | | | |
|-----------------|----|--------------------------|----|
| Filtered serum | 15 | Citrated whole blood | 15 |
| Citrated plasma | 23 | Defibrinated whole blood | 18 |

THOMAS C. DOUGLASS, M.D.

Balaguer M My Experience with the Transfusion of 80 Lites of Placental Blood (Miscellaneous) *lat nif on d 8 lit de sang e de pl ce ta* *Rev med d R a* 94 31 98

This article is an interesting report of the results obtained in the Hem therapeutic Service recently founded by the Argentine Government. A thorough description of the morphological, chemical, hormonal, and biological properties of the placental blood is given. Placental blood differs from that of adult donors in the following respects:

1. It contains a higher percentage of hemoglobin (average 15 per cent), a larger number of red cells

(average 6,000,000), and a larger number of white cells (average 11,680). This requires a 20 per cent dilution of the placental blood in physiological salt solution.

2 It has a rich content of gonadotropic and estrogenic hormones.

3 Certain substances which exert a powerful immunizing action on measles are present in the blood serum.

Each placenta yields, through manual expression of the umbilical cord, an average of 100 c cm of blood, which is preserved for about one week in a 3.8 per cent sodium-citrate solution (10 per cent of volume) or in the salt solution suggested by the Hematological Institute of Moscow.

The most difficult problem in the prevention of the transmission of infective diseases lies in the exact recognition of syphilis. As is well known, pregnancy makes the results of the Wassermann reaction uncertain. For this reaction in the placental blood, an impractical quantity of blood is required. The proposal to apply to the placental blood the Kline and Chediack microreactions, which require only one drop of serum or blood, respectively, is therefore interesting.

Among the very promising clinical indications seem to be certain endocrinopathies and possibly some types of tumor (as is suggested by experiments with placental or embryonal extracts). However, no results are reported in these conditions. The use of placental blood serum for the prevention of measles appears interesting. If the serum is injected within the first six days of incubation, the disease develops in an attenuated form. The immunization lasts from one to three months.

There were only 3 fatal accidents, due to gross technical errors, among 294 blood transfusions.

EMANUELE MOMIGLIANO, M D

Fischer, R., and Jeanneret, H. *The Morphology and Biological Properties of the Leucocytes of Preserved Blood* (Morphologie et propriétés biologiques des leucocytes dans le sang conservé). *Rev med de la Suisse Rom*, 1941, No 6, p 347.

Fischer and Jeanneret present a study of the changes taking place in the leucocytes of blood preserved with different anticoagulants. The anticoagulants employed were sodium citrate, heparin, and a hexose preparation which one of the authors (Fischer) has found to have marked anticoagulant properties and which has been given the name of "sangostat." The blood when withdrawn was mixed with the anticoagulant and kept in an ice box in ampules of 120 c cm each. Specimens of blood were carefully withdrawn from these ampules at intervals and examined for hemoglobin and the condition of the red and the white cells.

With all anticoagulants, the hemoglobin percentage and the red cells diminished slowly, somewhat more rapidly with sodium citrate and heparin than with sangostat, the red cells, however, were "physiologically utilizable" for a month. With both sodium

citrate and heparin the leucocytes diminished rapidly and lost their characteristic appearance within a few days. They also lost their power of phagocytosis, amoeboid motion, and vital staining. The eosinophils were more resistant. In blood preserved in sangostat, the leucocytes diminished very little in number and showed only slight morphological changes, but with this preservative they also lost their vital activity rapidly.

Preserved blood, therefore, is different from fresh blood, especially with regard to its white cells, as far as these cells are concerned it is "a dead tissue." When transfusion is used to combat anemia, this change in the leucocytes is of relatively little importance. However, if transfusion is used to combat infection, the question arises as to whether the presence of the living, phagocytic leucocytes is the necessary factor, or whether the plasma or the substances liberated by autolysis of the white cells are effective against the infecting organism. If the former is the case only fresh blood or blood citrated and preserved less than twenty-four hours should be used. This question is still an open one and requires further study.

ALICE M MEYERS

Mahoney, E. B., Kingsley, H. D., and Howland, J. W. *The Therapeutic Value of Preserved Blood Plasma*. *Ann Surg*, 1941, 113, 969.

The authors report the use of preserved blood plasma and lyophile plasma 340 times in 110 patients with varying conditions. Of these patients, 3.5 per cent had reactions, 2.6 per cent had chills and fever. The conditions in which the plasma was used were traumatic and operative shock, 22, hemorrhage, 20, burns, 2, postoperative hypoproteinemia, 14, postoperative hypoproteinemia with paralytic ileus, 12, hepatic disease, 11, renal disease, 4, hemorrhagic disease of the newborn, 4, hemophilia, 3, toxemia of pregnancy, 5, and miscellaneous causes of hypoproteinemia, 13. The authors found the use of plasma most efficacious in shock resulting from operations, trauma, and hemorrhage. In these conditions it was essentially comparable to whole blood. They believe that diluted plasma rather than the concentrated solution of plasma should be used in treating shock. Cases were reported illustrating its successful use.

Results in cases of hypoproteinemia, while not quite so dramatic as those in shock due to trauma or hemorrhage, showed that the use of diluted plasma was very efficacious. An illustrative case was reported. In both the simple case of hypoproteinemia with infection and that with infection and paralytic ileus the response was excellent, with disappearance of edema, improvement in the appetite, and obvious general clinical improvement.

Only 2 cases of burns were treated with plasma, but in both of these good results were obtained.

Patients with renal disease having albuminuria have received large amounts of concentrated plasma intravenously. The plasma produced a transient diuresis, but the protein loss in the urine was in-

creased and edema recurred when the plasma was stopped. In hemorrhagic disease of the newborn a rapid response was produced and a decrease in the prothrombin time was very rapid which carried the patient over the late period of vitamin K in activity. A case of hemophilia which had severe reactions to whole blood transfusions was infused successfully with 50 c.c.m. transfusions of plasma at weekly or bi-weekly intervals. The patient had only on mild reaction to more than 45 injections of plasma.

A number of precautions are listed which the authors believe to be necessary in the administration of plasma: (1) the wet plasma should not be heated above 37° C prior to injection; (2) dried plasma should never be regenerated with Ringer's solution as coagulation may result; (3) plasma should be injected slowly else it may produce congestive heart failure by consequent increase in the venous pressure; (4) transfusions of whole blood should not be given immediately after pooled plasma; and (5) plasma showing excessive hemolysis should be discarded.

In discussing the comparative merits of plasma and whole blood the authors state that there should be no conflict that plasma is an excellent substitute in many conditions. Because of its lack of deterioration, ease of preservation and immediate availability it has a great deal of merit. It also has the advantage of not requiring typing and cross matching in emergency. Lymphoid plasma probably can be permanently preserved. The authors believe that until such a time as proteolytic digests have become more successful, plasma serves a very useful purpose in the condition of hypoproteinemia.

THOMAS C. DOUGLASS, M.D.

LYMPH GLANDS AND LYMPHATIC VESSELS

Barnes, J. M. and Trueta, J. Absorption of Bacteria, Toxins and Snake Venoms from the Tissues. Importance of the Lymphatic Circulation. Absorption of Chemical Substances. Snake Venoms. Bacterial Toxin. Lymph Flow in Inflammation. *Lancet* 1944, 40, 633.

The authors of this article report some experimental findings showing how foreign substances for example bacteria and the toxins of snake venoms are absorbed from the mesenchymal tissues and carried to the blood stream. It became clear during the course of their work that the lymphatic circulation played an important part in the process.

Bacteria like inert particles travel from the tissues to the blood only by way of the lymph stream. This is true even in freshly inflicted wounds in which there might be some chance of their entering the recently divided blood vessels.

Black tiger snake venom with a molecular weight of over 20,000 is not absorbed from a limb in which the lymphatics are obstructed or from one that is completely immobilized. Similarly Russell's viper venom and diphtheria and tetanus toxins all with molecular weights exceeding 20,000 are much less

readily absorbed from limbs that have been immobilized. Since it is known that no lymph will flow from an immobilized leg, the effect of immobilization on the absorption of these venoms and toxins must be explained by the assumption that they are carried from the tissues to the blood stream only by the lymph.

Cobra venom (molecular weight under 5000) like strychnine is absorbed with equal rapidity from a normal limb from one in which the lymphatics are obstructed or from one that is immobilized. These substances must enter the blood stream immediately, presumably by virtue of the rapturous smaller molecules. The study of the absorption of substances from immobilized areas may afford a means of finding out the exact route they follow.

In edema the production and flow of lymph are greatly increased and inflammatory edema is prevented from developing the lymph flow may be substantially reduced. A method by which edema may be prevented and at the same time complete immobilization be secured is by the enclosure of the injured part in a closed plaster cast. The reduction of the lymph flow obtained by this means is further enhanced if local drainage of the inflamed part is provided by incision.

The effect of immobilization on the absorption of tetanus toxin suggests that this substance is carried to the blood by the lymphatics and if the recent experimental proof of the local action of this toxin is taken into account the authors believe that the old theory—that a toxin can travel up nerve trunks—should be discarded.

HERBERT F. THURSTON, M.D.

Walsh, J. C. and Medlar, E. M. Acute Myelogenous Leucemia. *Am. J. Cancer* 1940, 40, 447.

Acute leucemia is a disease which runs a rapid course and with rare exceptions terminates in death within a few days to a few months after its recognition. The symptomatology is so varied that the true nature of the illness is often not apparent until blood studies have been made. By the time the patient comes under the physician's care the disease is already active; hence no one knows how long the process may have been evolving before the clinical evidence of illness became apparent. There is a question also as to whether the terminal condition may not be an acute phase of a chronic leucemic process which has gone unrecognized.

The authors note that there is no instance recorded heretofore in the literature in which acute leucemia was discovered prior to clinical manifestations of the disease. The case presented by them is full data was discovered in the course of the taking of serial leukocyte counts in a patient who was being treated for tuberculosis and was discovered prior to any clinical manifestations of the disease.

Whether the tubercle bacillus, the streptococcus or the bacillus paratyphosus B had any direct bearing upon the acute leucemic process in this patient is a question but at least these bacteria all need to be

considered as possible etiological factors. It is certain, however, that none of these infectious agents is consistently found in acute leucemia. Fumes from electric welding may have a possible etiological significance, but there is no direct connection between the appearance of the leucemia and the exposure. No excessive incidence of the disease has been found among welders. The role of pneumothorax therapy administered to the patient is also uncertain, so that the cause of the acute leucemia in this case remains unknown.

The data of greatest interest are the blood findings. The blood counts made from October 24, 1935, until April 9, 1936, revealed a leucocyte picture consistent with a tuberculosis which was not being favorably influenced. The change in the leucocyte count from April 9 until the death of the patient June 23, 1936, was not consistent with any leucocytic reaction ever seen by these investigators in a tuberculous case. The first significant shift occurred in the differential leucocyte picture, to be followed later by an increase in the total leucocyte count. The change in the circulating blood occurred two weeks before the advent of a sore throat and six weeks prior to any clinical evidence which would suggest that a severe blood dyscrasia might be

present. Had the leucocyte picture not been followed with the idea of studying the patient's reaction to the pulmonary tuberculosis, the early leucemic changes in the blood would have been missed entirely.

The history in this instance illustrates how insidiously an acute leucemic process may develop, without a previously existing chronic leucemia.

The patient was considered at first to have an acute monocytic leucemia. The completed data show conclusively that it was an acute myelogenous leucemia from the outset, and that the cells first regarded as of the monocytic variety were in reality largely primitive marrow cells. The supravital technique of blood study is insufficient in itself to establish the diagnosis. While admitting that actual acute monocytic leucemia may occur, the authors believe that at present cases of acute myelogenous leucemia are wrongly called acute monocytic leucemia. Many of the cells which have been described as monocytes in acute leucemia may well be small megacaryocytes.

It is also of considerable interest that in this case some of the lymph nodes presented a pathological process somewhat resembling acute Hodgkin's disease.

HERBERT F. THURSTON, M.D.

SURGICAL TECHNIQUE

WAR SURGERY

Guerman S. A Clinical Study of Non Penetrating Wounds (Fluk der Steckschuesse) Ch 1: 1940 No 8 p 87

The author reports a number of cases illustrating what he considers important points in the treatment of gunshot wound. These cases were seen in the dressing stations for the wounded from the battles at Chasan Sea.

1. Forty per cent of the wounds were due to shell fragments, 45 per cent to fragments of hand grenades and gun grenades, 45 per cent to shrapnel bullets, and only 10.5 per cent to bullets from guns and machine guns.

2. According to their remaining penetrating force the bullets ricocheted on their way through the tissues and were for this reason often lodged at a site which could not be assumed from the point of entry. So that localization without the use of the x-rays was extremely difficult.

3. Only in relatively rare instances was primary wound treatment (either with subsequent suture or tamponade or leaving the wound quite open) administered at the chief dressing station or at the field hospital.

4. Thus 72.5 per cent of the cases were treated conservatively and only 23 per cent operatively (removal of the missile). Of these cases 17.2 per cent were treated at the chief dressing station and 45.6 per cent in the field hospitals while 37.2 per cent were treated in stations or hospitals even farther back. In the remaining 4.5 per cent the missile was eliminated spontaneously.

5. The results of conservative treatment: (a) With regard to the type of wound (of large or small extent) the wounds with a large zone of destruction (8.6 per cent) rarely healed smoothly and usually went on to suppuration (22 per cent), abscess (3.3 per cent), anaerobic infection (0.6 per cent) or some other type of complication (12.3 per cent). The wounds in which the zone of destruction was small (38 per cent) often healed primarily, less frequently with suppuration (10.6 per cent), anaerobic infection (0.6 per cent) or other complications (4 per cent). (b) With regard to the type of missile the best results were obtained in wounds due to bullet from rifles or machine guns in spite of the greater number of wounds as there were no splinters as found in wounds from hand and gun grenades or in wounds with larger fragments and finally wounds from grenade splinters which are the most unfavorable type.

6. The results of operative treatment. Judged by the criteria mentioned in Paragraph 5 we get practically the same picture.

7. Of greater significance for the results of operative treatment is the time of removal of the missile.

Such an intervention in a wound ready to granulate or already granulating will often lead to most disastrous results. A demonstration in curves of the relation between the time of operative intervention (number of days after injury) and the course of healing shows clearly two critical periods: (a) from the second to seventh day (the stage in which infection is still active and beginning the formation of granulation tissue) and (b) from the fourteenth to fifteenth day (the stage of an immunobiological crisis in the development of defense material by the organism). The surgical removal of the missile should therefore be done either at the time of the first wound revision or when the wound has healed.

From these observations it is clear (with the reservation that they are based on a relatively small material) that as regards indications for removal of penetrating missiles the following is true:

1. The nearer to the front the wound is treated the more conservative should be the treatment.

2. In the chief dressing stations and field hospitals only the following conditions are absolute indications for operative removal of the missile: suspected poisoning of the missile with war material pressure on vital organs already demonstrable signs of severe infection (including anaerobic infection) and instability and removability of the missile.

3. In hospitals at the rear the indications for removal of the missile are as follows: clearly recognizable functional disturbances due to pressure on the nerves or blood vessels and cerebral localization with certain chances of orientation. It should never be attempted to remove a foreign body surgically from severely inflamed tissues such as phlegmons, abscesses or gangrene.

The question as to whether all foreign bodies should be removed sooner or later is left open by the author and its answer depends on the results of further experiments on healing in the presence of foreign bodies in the various tissues of the organism.

(SCIENCE) EDITH SCHANCHER MOORE

W. R. The Results of Primary Treatment of Wound in the Front Line and of the Treatment of the Various Types of Wounds in the Base Hospital. (Was 1 tet d rste flle im F rnt h d d l b d l g d erschieden n l ten) rusch Krank n sm ruckw l g n La x ett) O l p i mot 94 14 8

The author relates the observations made in a war hospital in White Finland. The material consisted of seriously wounded cases from front line hospitals where previous treatment had been given often for as long as three months. Of more severely injured cases which had received first aid at the front were also included.

The status on admission and the further course of these cases indicated that initial medical care had

been carried out expertly and intelligently. The primary care of the wounds varied in manner and extent, but made no use of primary suture. For the most part, gunshot wound tracks were not split open, but were excised at the points of entrance and exit and not sutured. However, they all healed uneventfully—more rapidly and with better scars than primarily incised wound tracks—just as in other cases in which it was necessary to guard against too great "radicalism" in the primary treatment of wounds.

Large wounds of the soft parts must be placed at rest by splinting, as well as all gunshot fractures, including those of the hands and fingers. Immobilization should take place in physiological midposition and must accurately fulfill the intended purpose. The wound should remain accessible by means of windowed casts. Extension splints are indicated in the treatment of gunshot wounds of the upper as well as of the lower extremities.

Gunshot fractures of the leg were often admitted in bad condition in spite of previous treatment in front-line hospitals. Blood transfusions were used too infrequently in view of their value. Such cases were admitted in unsatisfactory condition. Poor position of the fracture fragments and its sequelae could have been prevented by more careful treatment with skeletal traction. Nevertheless, later treatment in the military hospitals still made it possible to secure satisfactory functional healing of all cases without amputation.

The reconstructive treatment of injuries of the extremities is directed primarily toward prevention or removal of disturbances of function, it operates mechanically and physically, pre-eminently through medical gymnastics. The author regards this to be the most effective form of treatment, especially when applied as early as possible.

(SCHÖBER) O THEODORE ROBERG, JR., M.D.

Rose, D. L., Kendall, H. W., and Simpson, W. M. Refractory Gonococcic Infections, Elimination by Combined Artificial Fever and Chemotherapy as Related to Military Medicine. *War Med.*, 1941, 1: 470.

Rose, Kendall, and Simpson, working at the Kettering Institute of the Miami Valley Hospital in Dayton, state that there is no longer any valid reason to doubt that sulfanilamide and its derivatives provide an extraordinarily effective weapon in the control of gonorrhea. There are instances, however, when the drugs are completely ineffective or when they produce symptomless carriers. The authors demonstrated that the resistance of gonococcic infections refractory to chemotherapy was not paralleled by resistance to artificial fever therapy. Of even greater importance was the demonstration that not only are these two agents compatible in simultaneous use, but the combination was actually more efficacious than either agent employed singly.

The 105 patients included in this report were only those whose gonococcic infection was bacteriologically active despite prolonged chemotherapy with

either sulfanilamide, sulfapyridine, promin, or sulfathiazole, together with a few who exhibited intolerance to these drugs. All patients were hospitalized. The ages varied from sixteen to fifty-six years. The apparatus employed was the hypertherm. No patient experienced any ill effects from the combined treatment.

In the determination of cure, bacteriologically negative cultures after a minimum period of three months were classified as successful. When fever alone was employed, prolonged levels of hyperthermia were necessary to obtain a high percentage of cures. When the level of treatment efficiency was established, the incidence of cure was raised to 100 per cent if chemotherapy was administered for eighteen hours before the institution of fever therapy. Administration of the drug during the fever was apparently of no value. Subsequently it was shown that both the height and duration of the fever could be reduced to 106° F. for eight hours when chemotherapy was used, which reduced the period of hospitalization for the patients to forty-eight hours and enlarged the field of usefulness of this therapeutic program. All patients were cured by a single session of this combined treatment. The method being uniformly safe and effective, the authors "recommend it as a feasible and practical method for the elimination of refractory gonococcic infections as a casualty agent among military and naval personnel."

EDWIN J. PULASKI, M.D.

Reed, G. B., and Orr, J. H. Rapid Identification of Gas-Gangrene Anaerobes. *War Med.*, 1941, 1: 493.

Using the Spray method for the identification of anaerobes, the authors increase the utility of that scheme by bringing together a group of diagnostic reactions and utilizing to a large extent the newer mediums, especially Brewer's thioglycolate medium, which will yield precise results in a twenty-four hour period. The formulas are given for the culture mediums used for isolation and identification. These have been shown to support the rapid growth of all species of anaerobes known to be associated with gas gangrene in man. The most significant differences between the twenty odd species of gas-gangrene bacilli are to be seen in their action on dextrose, lactose, maltose, salicin, and sucrose. Other important biochemical reactions include changes in milk, the production of hydrogen sulfide, gelatin liquefaction, nitrate reduction, indole production, and the digestion of milk agar. The differential reactions are tabulated. Colony forms on agar plates or in subsurface growth, the type of hemolysis produced in blood agar, and the morphology of the organisms are additional differential factors.

The media described facilitates rapid isolation of the species, differentiation of the colony structure, and determination of the morphological character and makes possible in twenty-four hours a series of biochemical reactions generally sufficient to differentiate the species. A few atypical strains had been

encountered and these instances are listed. A procedure for isolation and identification is outlined and includes the Gram stain and inoculation of culture material in meat broth and in the glycolate medium in three serial dilutions. From the latter surface plates are made on blood and clear agar and some plates on semi solid agar. All are incubated in an anaerobic jar.

When growth is obtained single colonies are studied with a lens and are fished from the plates in the usual manner and inoculated into the described diagnostic mediums. Smears aid in checking the purity of the cultures and frequently supplement the biochemical differentiation of the species. Immunological relations do not provide simple or rapid means of species identification but toxins when produced are species specific and specific neutralization of hemotoxins can be tested rapidly with the thio glycolate medium. There is a series of photographs showing characteristic colony form types.

EDWIN J. PUSKAS, M.D.

Broster, L. R. *Surgical Problems of the War*. 1914. 389 p.

The modern high explosive aerial bomb is more destructive than maiming. Its dangers may be summarized as follows:

1. Injuries due to direct hits
- Blast injuries
3. Crush injuries from falling masonry
4. Burns
5. Splinter wound from bomb casing and glass

The principles of treatment of head wounds are fundamentally the same as in the last war.

1. Removal of infective material and dead brain tissue
2. Removal of blood clot (extradural or subdural) and aerocoele
3. Because of the danger of epilepsy the possible removal of foreign bodies

Abdominal injuries comprise 2 per cent of all the wounds and have a high mortality rate. The local application of sulfanilamide powder to the abdominal wound will prevent infection and the introduction of sulfanilamide in saline solution into the peritoneal cavity and the application of the powder to the sites of injury and repair may improve the prognosis.

Chest wounds are low in incidence but high in mortality. For shock and loss of blood plasma or blood is given in large quantities. Oxygen therapy is invaluable. All patients are given sulfanilamide treatment for the first two or three days. Local application of this drug to the wound is also beneficial. The indications for immediate operation are:

1. Open pneumothorax with sucking wound which lead to tension. Tension phenomena are recognized by the position of the trachea.
- Acting as a valve for an intercostal valve.
3. Pressure phenomena from internal valvular pneumothorax or the accumulation of pleural blood.
4. Pericardial effusion of blood.

5. Retained foreign bodies. These are most dangerous in the region of the hilum of the lung and pericardium. Those larger than a bean should be removed and the hemothorax evacuated.

In hemothorax the blood on the whole remains fluid. The treatment is aspiration and removal of the fluid as soon and as completely as possible. In early cases gas replacement is advisable followed by daily aspiration until the pleura is dry. If mass of clot is left it is well to remove it by a small local operation within ten to fourteen days.

For burns of the hands and face tannic acid has been found unsatisfactory because of resultant scarring. The application of 2 per cent triple dye, gentian violet, 1 per cent brilliant green and 1 per cent acriflavine is recommended though some surgeons prefer the application of sulfonamide and glycerol.

SAMUEL KAHN, M.D.

Axhausen, G. *The Treatment of War Wounds of the Face and Jaw*. (D. Krüger, ed.) Berlin, 1914. 94 p.

This book which was written for dentists does not presuppose a course in surgery. For this reason there is a description of the simple operative technique of hemostasis as well as of ligation of the external carotid and lingual arteries and of tracheotomy. Axhausen describes very accurately the technique of conduction anesthesia of the second and third ramus of the trigeminus.

Surgeons will be particularly interested in the author's stand on the question of operative wound revision on fresh injuries and on the question as to whether bone fracture or wound revision should receive first attention. Axhausen very clearly and definitely deviates from the generally accepted viewpoint of most surgeons by advocating primary wound excision and suture according to Friedrich and surgical revision of the wound. Then turning specifically to injuries of the face and jaw he expresses great astonishment that both surgeons Klapp and Franz and dental surgeons Richter and Lindmann hold the opinion that surgical revision of the wound should be dispensed with in these injuries. He believes the matter to be some mistake as surgical wound revision is looked upon with equal favor as radical excision according to Friedrich and complete closure by suture. The latter he likewise rejects in this field except for tangential tears without bone injury. However he is a staunch advocate of surgical wound revision with partial suture. This intervention is not bound by the six to eight hour limit. If it is used within the first three days one may still count on a smooth healing of the parts united by suture. Even if one is forced to leave the wound open this surgical wound revision exercise is a favorable effect in that partial suture can be performed up to within the second week. However such sutures are frequently cut through but atrophy has been prevented and this is a great advantage from the cosmetic point of view and it shortens the course.

considerably. As a result one may without hesitation apply Pichler's orthopedic treatment for fractures because the surgical wound revision and partial suture will not be too late. It is, moreover, not absolutely necessary that the fragments should be in ideal position. He continues to say that he would perform wound revision to begin with, in order to free the wound at the start from the mortifying elements, and then admits that should the planned partial suture hinder orthopedic work, one may leave the wound open. Delays of hours or of half a day are of no significance in this connection, nor is the contact of the saliva with the fresh wound. He believes that eventually leading dental surgeons will agree with him.

The article contains 46 illustrations

(FRANZ) EDITH SCHANCHE MOORE

Peiper, H. *Bullet Injuries of the Spinal Cord and Their Management* (*Die Schussverletzungen des Rückenmarks und ihre Behandlung*) *Med Welt*, 1940, p. 421

Until the time of the World War the opinion was prevalent that gunshot wounds of the spinal cord were not suitable for surgical treatment. Operative success during the war caused a change in this point of view. The author classifies injuries of the spinal canal as direct and indirect. He also points out that such injuries may be incurred without any injury to the vertebral column.

Gunshot wounds of the vertebral bodies cause mainly minor injuries, whereas injuries caused by sharp-edged splinters from the vertebral arch may be very severe. Segmental diagnosis of traumatic lesions of the spinal canal is very difficult. To draw any conclusion from the course of the bullet usually leads to error. Only by the application of all available diagnostic measures, such as neurological studies, x-ray examinations, and by careful study of the spinal fluid can accurate diagnoses be made. The injuries of the spinal canal are of all grades, varying in severity from total transectional lesions to macroscopic and microscopic, though recognizable, lesions which may be associated with marked loss of function. Serosal meningitis, radiculomeningopathy and myelomeningopathy are feared as complications and present a serious operative problem. In determining the indications for surgical procedure the symptoms and signs *per se* are not as important as are their consistency and their course. Early following a cord injury it is difficult to differentiate an anatomical from a functional break in the nerve pathways. The development of trophic edema of the legs and scrotum usually indicates an anatomical lesion. Involuntary movements of the injured limb do not signify to the contrary.

Marburg and Ranzi attempted to describe a special compression syndrome in which they pointed out that an early spastic paresis develops in cases which have motor disturbances with certain sensory losses. Still the manifold overlapping and gradations of conditions offer obvious difficulties. To

these syndromes are added the partial cord lesions and the picture of spinal hemiplegia either in the form of a Brown-Sequard or an Oppenheim unilateral paralysis. It is important to differentiate conus injuries from caudal lesions. Marburg states the caudal lesions are characterized by flaccid paralysis of the legs and loss of patellar, achilles, and plantar reflexes with a corresponding muscle atrophy and sensory loss from the third lumbar to the fifth sacral vertebra, and bladder disturbances. The latter sign is absent in some cases, which fact is difficult to explain.

The author then takes up the question of indications for primary operation. He treats small calibered lesions expectantly. He states that spinal-fluid fistulas should be covered whereas more extensive injuries require debridement and the removal of any bony splinters that may be present. He cautions against the opening of an uninjured dura especially in the presence of infection. As regards the optimum time for surgical intervention, it can be said only that there is an agreement of opinion in that early operation is recommended. Schmieden never waits longer than from eight to ten days. Marburg and Ranzi operate during the second or third months. The type of procedure depends on the operative findings. A wide exposure is required in all procedures excepting those in the cervical spine. Serosal cystic meningitis requires opening of the cysts, freeing of the adhesions, and puncturing of the edematous pia. Indurations should be removed. If severe pain which is not readily controlled by the usual anodynes is present, section of the anterolateral columns should be considered. A simple procedure is the section of the dorsal roots. The patient should lie on his abdomen during the postoperative course. The mortality of bullet wounds of the spinal cord is of course very high at the front. Rumpel reported in 1915 a mortality of 65 per cent and Frangenheim in 1916 a mortality of 43 per cent. Pousseps, however, had a mortality of only 3½ per cent in 275 operations.

(W. MANDEL) RULON W. RAWSON, M.D.

White, B. *Mass Roentgenography of the Thorax, with Special Reference to Its Application to Recruits for the Army* *Med J Australia*, 1941, 2, 23

After briefly reviewing the literature relating to the miniature fluoroscopic photographic method of chest examinations, the author presents his experience with it as carried out on many thousands of examinations of army recruits. Omitting technical roentgenological details, he describes the routine procedures employed. In all instances in which the miniature films revealed suspicious or definite pathological changes, check-up examinations by full-sized films were made. A critical review of 40,000 miniature films disclosed 365 cases of tuberculosis, of which 156 were designated as "possibly active" and 209 as "possibly inactive." Other abnormalities, totaling 81, were also tabulated.

The author believes that use of the method has fully justified itself. It renders the detection of tuberculous lesions more certain and therefore prevents induction into the service of individuals unfit for active duty and a menace to other recruits with whom they might be confined in barracks. Its expense is more than offset by pension costs which might accrue otherwise. ADOLPH HARTUNG, M.D.

Scadding J. G. Some Aspects of Closed Wounds of the Chest. *Brit. Med. J.* 1941 2: 57-94.

The principal dangers of wounds of the chest are: 1. Mechanical. Open pneumothorax due to large gaping wounds is productive of great respiratory distress. These wounds demand immediate closure. Tension pneumothorax produced by valve-like injuries to the lung requires active treatment. A closed pneumothorax unless of large size and undrained may be beneficial.

2. Hemorrhage from the lung into the pleura. This usually ceases after the lung collapses. If hemorrhage from the chest wall into the pleura is more apt to require surgery to control it.

3. Infection. This occurred in from twenty to forty per cent of the cases during the World War and is the immediate cause of late deaths.

The use of an artificial pneumothorax apparatus to measure intrapleural pressure is absolutely essential to the intelligent treatment of chest injuries.

Surgical intervention must be carried out immediately when there are large external sucking wounds, extensive external wounds and hemorrhage from the chest wall or evidence of a foreign body.

Prophylactic chemotherapy should undoubtedly reduce the incidence of infection and should be given as early as possible in every case.

The author believes that in the management of the closed thorax after penetrating wounds blood should be aspirated from the chest and replaced by air particularly if there is still hemoptysis present. Pneumothorax should be continued for one or two weeks. Simple aspiration of accumulated fluid should be done later if the amount is large or if there are signs of infection.

Infection must be carefully watched for by means of aerobic and anaerobic cultures and should be treated by drainage when present.

In tension pneumothorax the pleural pressure must be reduced to sub-atmospheric pressure. This may be done by inserting a needle between the ribs and attaching the needle to a tube the end of which is under water. JULIAN A. MOORE, M.D.

Brock R. C. Drainage of the Pleura. *Br. Med. J.* 1941 2: 125.

In cases of large wound of the chest wall that have been sutured and in which contamination of the pleura has undoubtedly occurred it is best to drain the pleura by an airtight intercostal drain for a few days.

The first war casualties that arrived from France had their chest wounds sealed up tight without

drainage. There were many cases of severe spreading and sometimes gangrenous cellulitis.

The author believes that these wounds should be debrided and closed with a dressing but not sutured tight until danger of spreading infection has passed. The parietal wound can and in fact should be closed by delayed suture after a few days if the risk of spreading infection seems to have passed.

The chief danger of hemithorax is infection. It must be closely watched for. The pulse rate is a more reliable indication than temperature. When infection does occur drainage should be instituted. Repeated aspirations are advised until the pleura has walled off followed by rib resection rather than early intercostal drainage.

The drainage tube should be removed only when the pleural cavity has been obliterated. Failure to observe this rule has been responsible for more chronic empyemas than any other single cause.

Patients with empyema should be made ambulatory as soon as possible and taught and made to practice breathing and postural exercises to promote re-expansion of the lung and prevent deformity.

JULIAN A. MOORE, M.D.

Gordon Taylor G. I. Abdominothoracic Injuries. *Brit. Med. J.* 1941 2: 895.

Surgical intervention directed to the liver is indicated: (1) when there is gross hemorrhage from the liver (light hemorrhage or oozing of bile will cease spontaneously); (2) when the association of a thoracic or another abdominal lesion demands exploration; and (3) when there is retention of a missile in the liver, especially a large one in an accessible portion.

In case of severe hemorrhage the liver may be packed to control it. The diaphragm should be sutured if torn and airtight drainage of the chest used separately from the abdominal drain. Early jaundice may be present and may be evanescent. Late jaundice denotes sepsis and is serious. Secondary hepatic hemorrhage is fatal as a rule. The formation of a hepatic abscess around a missile demands drainage.

Gunsight wounds of the spleen are usually treated by splenectomy and sometimes by suture. If there is an accompanying chest injury it may be approached from the chest and through the diaphragm.

Wounds of the pancreas are not frequently recognized. The author knows of only 3 cases involving the pancreas during the World War in which the patient recovered.

Wounds of the kidney are frequent. Probably the best course to follow is to excise the wound down to the kidney where it can be inspected, foreign bodies removed, the injury repaired or the kidney removed.

Of the hollow organs the stomach and spleen flexure are the most frequently involved in combined abdominothoracic wounds. Transdiaphragmatic laparotomy affords excellent access to these organs. It is said that the injuries from a missile that goes downward from the chest to the abdomen are less

serious than missiles that pass through the abdomen into the chest. Injury to the duodenum is serious and must not be overlooked.

In many injuries an expectant line of treatment may be followed provided (a) no gross damage has been inflicted upon the thoracic or abdominal wall, (b) the direction of the track of the missile does not appear to compromise the general peritoneal cavity or suggest the desirability of its exploration, (c) the signs of abdominal hemorrhage or of injury to a hollow viscus are clearly absent.

Wounds are caused not only by bullets but by the force of high explosives or crushing injuries, as from the demolition of large buildings. Rupture of the diaphragm may be caused by these injuries. It should be recognized and repaired or else herniation will occur with disabling symptoms.

The use of blood and blood plasma and the sulfonamide group of drugs will greatly help in reducing the mortality of these severe injuries.

JULIAN A. MOORE, M.D.

Patey, D. H., and Robertson, J. D. *Compression Treatment of Crush Injuries of the Limbs, Theories of the Cause of Renal Failure*. *Lancet*, 1941, 740-780.

Compression of a limb or limbs by debris as a result of aerial bombing frequently causes a form of shock which proves fatal. The shock is rather rapid in onset and is accompanied by edema of the injured limb. Sensory disturbances of the involved extremity, oliguria, and anuria finally lead to the death of the patient. Laboratory examinations reveal a markedly alkaline urine containing albumin, a low alkaline blood reserve, reduced plasma proteins, nitrogen retention, and elevation of the serum potassium.

This syndrome of shock and renal failure is believed to be caused by the toxic action of metabolites derived from the compressed tissues and released into the general circulation. Based on this theory, therapy has been directed to remove the source of the toxin by amputation of the limb combined with parenteral therapy to dilute and eliminate the toxin from the body.

The authors, however, have not accepted this view but claim that the syndrome is produced by the loss of circulatory constituents into the damaged area and by their forced return into the circulation. The onset of shock can be prevented. A positive-pressure Pavaex apparatus was attached to a large blood-pressure cuff which enclosed the injured limb. A maximum pressure of from 50 to 60 mm. of Hg was intermittently applied. As a result of this form of treatment in 2 cases, the author noted a softening and progressive diminution of edema, increased diuresis, and rapid return of the blood nitrogen to normal limits. Although suffering clinically from severe compression injuries, both of these patients recovered because of the mechanical massage whereby capillary tonus was maintained.

BENJAMIN G. P. SHAFIROFF, M.D.

Wilson, P. D. *The Treatment of Compound Fractures Resulting from Enemy Action*. *Br. Surg.*, 1941, 113-915.

The battle of Britain has shown that intensive bombardment from the air has introduced new problems in medical preparations for defense that call for an entirely new organization. The front is a region instead of a line. Facilities for the treatment of the wounded must now be organized in every village or hamlet. Also, the background against which treatment is given for compound fractures resulting from enemy action shows that there are two parts to the problem of medical organization: military and civilian. Certain observations may be made on the primary treatment. First, patients with compound fractures are apt to have multiple wounds and involvement of several bones. Second, patients injured by high explosive bombs are easily shocked and do not tolerate operations. When the patient shows evidence of shock he is given transfusions of blood or plasma, wrapped in warm blankets, given morphine, and kept under observation (in hospitals) until such time as his condition is improved and operation can be undertaken. Roentgen-ray examinations are made routinely, prior to operative treatment. Debridement is the nature of the operation. Powdered sulfanilamide was frequently applied to the wounds but not routinely. Primary closure of the wound is a matter of debate among English surgeons, but general opinion is opposed to it. In the majority of cases the wound was packed open with gauze, and anti-tetanic serum was administered routinely. Anti-gas-bacillus serum was used but rarely. Reduction of the fracture was accomplished by manual or skeletal traction and immobilization was obtained by the application of plaster-of-Paris. About half of the fractures of the femur were immobilized in Thomas splints, either with adhesive tape or by a pin through the os calcis. The fractures of the upper extremity were immobilized in plaster-of-Paris.

In the secondary treatment it was found necessary in the majority of cases to interfere with the Orr-Trueta method of treatment because of malalignment of the fracture or poor condition of the plaster, and more rarely because of the pain in the extremity, circulatory difficulty, fever, and other evidences of intoxication.

After attempts had been made to maintain alignment of the fractures and the fractures had been reduced, a snug unpadded plaster casing incorporating the pins was applied. At subsequent dressings the limb was placed in the reducing mechanism and the pins locked in it before the plaster was removed, so that rigid fixation was maintained. Under the Orr-Trueta method of treatment, the course of the patients under the author's care was extraordinarily good. The plaster encasements were changed and the wounds dressed at as infrequent intervals as possible—usually from four to six weeks. The chief indications were softening of the plaster, oozing, or atrophy of the extremity, so that it was feared the

immobilization might become less complete than desired. Immobilization was maintained until bony union was complete.

The author has late reports on many of these cases showing that union was maintained in most of them for from four to six months. Many of the wounds healed spontaneously. In others sequestration occurred and after its surgical removal healing progressed. The report also shows that there has been no instance of serious infection about the pins in 28 cases in which the Anderson and Haines methods were employed. The Orr Trueta method of treatment has taken a firm hold in England and is being widely used and in the author's opinion as well as that of many British surgeons it represents a great advance in the treatment of compound fractures resulting from enemy projectiles.

EMI L. ROBITSEK, M.D.

Harkin H. N. The Treatment of Shock in War time. W. J. 94, 150.

Harkin defines shock as progressive vasoconstrictive oligemia and a. The conditions in which oligemic shock may occur are tabulated. They are: 1. Hemorrhage (to the outside into the tissues into the body cavities).

2. Mechanic trauma (operative or accidental to internal tissues).

3. Thermal trauma (burns, freezing, peritoneal cooling).

4. Asphyxial trauma (mesenteric vascular occlusion, intestinal strangulation, tourniquet, heat stroke).

5. Actinic trauma (radiation burns, sunburn).

6. Chemical trauma (bile peritonitis, perforated peptic ulcer, acute pancreatitis, war gas, poisoning).

7. Trauma due to specific, non-specific poisons (mercuric bichloride, arsenicals, gold chloride, snake venom).

8. Special capillary poisons (tissue autolysis, histamine, anaphylaxis, pyrotoxin).

9. Medical conditions (diabetic coma, eclampsia).

10. Infections (cholera, pneumonia, especially influenza, and streptococcal, gas gangrene, diphtheria, peritonitis).

11. Hyperventilation.

12. Spinal anesthesia.

Treatment is divided into the empiric and the specific. Empiric treatment includes rest, quiet elevation of the feet, warmth, and the administration of sedatives, stimulants, and vasopastics.

Specific treatment is directed primarily toward restoration of the blood volume and includes the use of blood substitutes, whole blood, plasma, serum, oxygen, and adrenocortical extract. Whole blood is of prime importance in the treatment and either blood or plasma, both made readily available by the blood bank system, should remain the first choice. The plasma is probably superior to whole blood in any emergency except in carbon monoxide poisoning. Serum may be used instead of plasma.

The main objection to plasma is its tendency to develop fibrin particles on standing. The main objections to serum are its high potassium content and the possibility of increased reactivity.

Treatment of shock in wartime emphasizes the necessity for easily transportable whole blood or plasma. Stored blood packed in ice has been shipped over great distances without deterioration. Plasma or serum may be deaerated and transported under all conditions; it rapidly regenerates by the addition of distilled water. It may be concentrated and does not require refrigeration for storage. Hartman's method of drying and preserving plasma in single cell phone bag recommended by the author for military purpose because the bag wall is impermeable to bacteria and may be placed in tap water if necessary to put the distilled plasma in solution which eliminates the necessity of carrying an extra load of distilled water for dilution on purpose.

EDWIN J. P. LASKI, M.D.

Mitchell G. A. G. Jogle N. J. and Handley R. S. Casualties from the Western Desert and Libya Arriving at a Base Hospital (Flesh Wounds, Hemorrhage, Chondroplasty, Fracture, Amputations, Wound Involving the Body Cavity). L. 94, 40, 73.

Some hundred British and Italian casualties from the Western Desert and Libya arriving at a base hospital are reviewed from the standpoint of results of the treatment in forward and line of communication areas and the lesson learned. Every case had wounds of the soft tissues and all received prophylactic dose of anti-tetanic serum. Antiserum was seldom employed. The less serious cases did well after one or more dressings with sulfanilamide or acriflavine applied locally. The more serious cases had been subjected to debridement or complete excision and the local administration of sulfanilamide. Subsequently the treatment varied but the wound which was left open and packed loosely did best. Failures were due to incomplete or too late excision of the damaged tissues, the presence of foreign bodies, tight suturing, insufficient drainage or lack of rest. The liberal use of sulfanilamide did not neutralize the neglect of the cardinal points. Attempted removal of foreign bodies which could not be seen or felt before roentgenography was possible was usually attended by failure. Tight packing against hemorrhage uncontrolled by the ligation of bleeders is not recommended. Search for bleeders would be facilitated if operative assistants timely included small elastic retractors.

Wounds were found to be in better condition on arrival at the hospital if chemotherapy was used. Mitchell advises doses larger than those usually given and suggests that local application be accomplished by oral administration because of rapid absorption and excretion of the drug. The optimum doses suggested are 1.5 gm. four times a day orally and not more than 15 gm. locally unless serious infection supervenes within 24 hours of from 10 to 15 gm.

daily are given postoperatively. Blood examinations will warn against the advent of serious complications. Sulfanilamide given locally apparently produced better results than the usual antiseptics, except when the wounds became infected with the staphylococcus aureus.

Very few fractures had been missed and all arrived splinted and in good condition, except those infected. The closed plaster method was used extensively. The only criticisms were the failure in some instances to prevent the adhesion of plaster to the skin hairs by use of vaseline, and the omission of much desired extension in fractures of the femur.

No amputation case arrived in good condition, particularly because of insufficient general and local rest after operation. When rapid evacuation is imperative, the application of a plaster cap would keep dressings in position, minimize swelling, give support to the stump, and protect the stump from the minor traumas incidental to transport. Too long stumps and too tight suturing of skin flaps were avoidable operative errors in judgment. Men with guillotine amputations were all dangerously ill on arrival, because of infection, tender, painful stumps, and loss of serum, and this operation is not recommended unless the greatest of haste is necessary. Once done, skin retraction should be guarded against by some form of skin extension such as elastoplast straps fixed over the stump during operation. Of 6 patients with gas gangrene among the amputated cases, only 1 survived, all received sulfanilamide and some anti-gas serum.

Cases of chest and abdominal cavity injuries stand journey poorly and should be retained as long as possible at the first point where a surgical team is located. It is axiomatic that any wound of the abdominal parietes should be treated as though it involved the peritoneal cavity until this can be definitely disproved. In chest wounds the same axiom applies with regard to the pleural cavity. There has been ample verification of the fact that the size of an entry wound bears no relationship to the amount of internal damage.

EDWARD J. PELASKI, M.D.

D. Oliveira Estêves, J. V. Mujica, J. C. A. Rossignoli L., and Delucchi, J. The Indications and Contraindications for Airplane Transportation of the Sick and Wounded (Indicaciones y contraindicaciones para el traslado en avión de enfermos o heridos). *Rev. med. Lat.-Am.*, 1941, 26: 759.

Two methods can be followed to study the different questions connected with the problem of airplane transportation of the sick and wounded: (1) the clinical observation of the patients transferred by airplane and a critical analysis of all the circumstances occurring before, during, and after the flight, and (2) physiological experimentation, which allows by deduction, the extension of the results to some practical aspects of the problem.

The first method is preferred by the authors, who agree with the proposal of the Pan American Con-

vention of Medical Aviation to keep on special file the observations made for all the cases, medical or surgical, transferred by airplane. Air transportation constitutes both a medical and an aeronautical problem.

The medical problem may be summarized in this way:

1. There are some patients who must be transferred by airplane, because their only chance for survival depends upon an early surgical intervention.

2. Other patients may be transferred because of a real emergency to which the flight does not constitute a formal contraindication.

3. Other patients do not require airplane transportation, because there is no reason for an immediate surgical intervention.

4. In a last group of patients, airplane transportation is out of the question, because it would be too dangerous. The decision must be made by the physician, according to the kind of disease or injury and the local and general conditions of each patient. The list of indications and contraindications proposed by the authors for different diseases or injuries of the abdomen, thorax, and skull is of great value in this regard.

The aeronautical problem may be solved by the following propositions:

1. As a protective against cold and air rarefaction, the plane should be flown at low altitude, a mixture of oxygen and carbonic acid should be used, and heating devices should be applied.

2. In order to withstand the effects of sudden loss of altitude or speed the patient should be placed in the horizontal position.

3. Suspension of the patient and shock absorbers should be used to counteract the airplane vibrations.

4. The duration of the flight should be determined so that the existing emergency of each case may be weighed against the need for complete rest.

EMANUELE MOMIGLIANO, M.D.

OPERATIVE SURGERY AND TECHNIQUE, POSTOPERATIVE TREATMENT

Ollinger, P. The Influence of the Trauma of Operation on the Venous Blood Pressure (Der Einfluss des Operationstraumas auf den venösen Blutdruck). *Arch. f. klin. Chir.*, 1940, 190: 628.

The observation of the arterial blood pressure in patients, before and following surgical procedures has for a long time been a matter of course. However, the venous blood pressure has not so far received proper attention. This is notable in that in postoperative processes and in failures of the organism, whether they be due to peripheral circulatory weakness or to primary cardiac insufficiency, one would expect in the first instance to be dealing with venous stasis and flooding of the great venous reservoirs.

This neglect may be explained to a certain extent in that the method of measuring the venous blood pressure presents a number of difficulties, and in-

deed in certain groups of patients cannot be done at all since the necessary body posture (for example in those with lung operations) cannot be maintained or the postoperative forced respiration would lead to erroneous readings.

The author has conducted tests on 78 patients to determine what consistent variations in the venous blood pressure are to be observed following gastric operations, gastroenterostomies, appendectomies, gall bladder operations, strumectomies, breast amputations, hernias and minor operations. Observations must be made with great care before and repeatedly following surgical interference. A lowering of the venous pressure developed in 57 cases and an elevation in 21. The elevations were per centually predominant in the gaster operations while the other operative categories brought predominantly a lowering of the venous pressures. The blood pressure sank under the influence of the trauma of operation in an average of two-thirds of all the cases while in one third it increased. The changes in the blood pressure showed in most cases a certain relationship to the size of the surgical procedure. The form of anesthesia as well as the cardiac and circulatory disturbances also plays a rôle.

The study of the venous blood pressure following operation brings up a number of unexplained problems and further work is necessary in order to bring the measurement of venous blood pressure following surgical interference to the point where it may be employed as a reliable prognostic aid.

(RIESS) JOHN W. BRENNAN M.D.

Bess, E. L. The Role of the Adrenal Glands in Shock, the Value of Desoxycorticosterone Acetate in the Prevention of Operative Shock. *Arch. Surg.* 94: 43-249.

There is considerable evidence to substantiate the postulate that the adrenal cortex acts as a protective mechanism against the development of many of the so-called states of shock. Adrenalectomy produces a state of shock. No mal health and vigor under ordinary conditions may be maintained in adrenalectomized dogs by injections of adrenal cortical extract. There is a similarity between the signs and symptoms of adrenal insufficiency and those of secondary or traumatic shock and it has been suggested that the latter may be due to failure of adrenal cortical function.

The adrenocortical hormone has governing powers over the following factors: (1) the electrolyte balance, particularly the balance between the sodium and potassium ions; (2) the circulating plasma volume; and (3) the capillary permeability.

Much experimental work suggests that adrenocortical preparations are of value in the treatment of surgical shock. However, in spite of the evidence which has accumulated in the laboratory concerning the value of cortical therapy in the treatment or prevention of shock, there are few reports concerning the clinical application of this work. It is exceedingly difficult to determine the value of any thera-

peutic measure in preventing the shock associated with clinical operative procedures. The factors that produce shock under these conditions are hemorrhage, tissue trauma, neurogenic reflexes and depth and type of anesthesia vary markedly from case to case. The resistance of the patient also varies greatly since this is dependent on the states of dehydration and nutrition, the degree of anemia and other factors.

Seventy-two patients were given desoxycorticosterone acetate preoperatively in an attempt to determine its effect clinically in the prevention of shock. The results for the treated patients and the controls do not furnish sufficient data to support the conclusion that desoxycorticosterone acetate has any significant effect in preventing shock associated with general surgical procedures. SAMUEL KAHN M.D.

Dunphy, J. E. and Gibson, J. G. The Effect of Replacement Therapy in Experimental Shock. *Surg.* 94: 1-8.

It has been known for many years that a reduction of the effective blood volume is an essential feature of shock regardless of cause. Recently considerable attention has been directed to the pathological changes which occur in the tissues in shock. These consist principally of marked fluid congestion of the capillaries and venules in visceral areas, especially the lungs, liver, kidneys and gastrointestinal tract. The relation of these pathological changes to the reduced blood volume and the significance of this relationship in the treatment of experimental shock due to severe thermal trauma constitute the subject of this article.

On the basis of previous experimental work upon anesthetized animals who were subjected to severe thermal and mechanical trauma, it was demonstrated that under the conditions of these experiments the principal reduction of the blood volume was due to a loss of fluid at the site of injury and that the pathological changes in the viscera were a secondary rather than a primary phenomenon. These pathological changes consisted of congestion and dilatation of the capillaries, capillary hemorrhage, edema and in some instances particularly in the liver, degeneration in perenchymatous tissues.

The present study was designed to relate the physiological effects of fluid replacement with the pathological changes in shock. The authors ask the question whether these tissue changes are a consequence of the reduced blood volume or whether they are due to some factor such as a toxin absorbed from the site of injury which produces generalized capillary injury irrespective of the level of the blood volume. They state that if the pathological changes are a consequence of the lowered blood volume, it should be possible to prevent them by restoration of the blood volume to normal. This has been attempted both in the early and late stages of experimental shock due to thermal trauma.

Large mongrel dogs were used in all of the experiments. Shock was induced by thermal trauma. De-

terminations of the pulse, blood pressure, hematocrit, plasma volume, hemoglobin, and serum proteins were made before and at varying intervals after the injury. The experiments were divided into three groups. In one the effects of treatment in late shock were observed. In another the response and end-results of a single infusion of plasma or saline solution in early shock were determined, and, finally, the effects of continuous infusions of plasma were studied.

Under the conditions of these experiments, replacement therapy instituted in the late stages of experimental shock has no effect on the pathological changes in the tissues even though it restores the blood volume to normal. In early shock a single infusion of saline solution, in amount calculated to raise the blood volume to normal, not only is of temporary benefit but causes such a dilution of the plasma proteins that the late tissue changes of shock are accentuated. Under the same circumstances the beneficial effects of a single infusion of plasma are also of only short duration and bring about no alteration of the pathological changes. By a continuous infusion of plasma, begun early in the experimental period, the blood volume may be maintained at normal levels and under such circumstances there is a marked amelioration of the late tissue changes in shock. The amounts of plasma necessary to do this are considerably in excess of those generally used in the treatment of burns in patients.

SAMUEL H. KLEIN, M.D.

ANTISEPTIC SURGERY, TREATMENT OF WOUNDS AND INFECTIONS

Sommer, R. The Prophylaxis of Tetanus (Zur Prophylaxe des Tetanus) *Ztschr. f. Immunitätsforsch. u. exper. Therap.*, 1940, 99, 168.

The wound toilet of Friedrich is to be regarded as an essential, and indeed the best defense against tetanus. Indications for the administration of the antitoxic serum are an unfavorable form of the wound (lacerated wound edges, pocket formation, shredded muscle tissues), bad appearance of the wound (more or less contamination by dirt), and a wound sustained in a suspected locality (street, region given to tetanus, agricultural environment, horse stables, garden), mining injuries and injuries by burn also may result in tetanus infection. These injuries, therefore, are to be considered in the study of indications. The tissue necroses following freezing or injuries due to the electric current likewise appear to provide a good nutrient medium for the spores of tetanus. The author asserts that the occasional instances of failure of prophylaxis, which are extremely rare, do not form an important contraindication for tetanus prophylaxis of the injured. He believes that the dangers, which tetanus prophylaxis is said to bring, are exaggerated, though, of course, the administration of the serum demands certain precautions. The danger of shock may be averted, by the subcutaneous injection of 5 c.c.m.

and then of the rest of the dose if no anaphylactic manifestations have appeared after several hours. It is further recommended that the serum be given during the narcosis incident to the wound toilet, since, as a matter of experience, shock will not appear during narcosis.

In about 40 per cent of the cases, following the employment of horse serum, serum sickness occurs, which, however, will assume a severe character only if edema of the glottis appears. This may best be prevented by injections of calcium coincident with the serum injection. The frequency of serum sickness can be lowered by the use of sheep serum. A particular form of expression of serum sickness is the neuritis that may slowly appear in the second week.

The profound significance of tetanus prophylaxis in time of war is emphasized. Prophylaxis is to be carried out in every injury, whether from bullet or shell splinters. (HAAGEN.) JOHN W. BRENNAN, M.D.

Botto Micca, A. Camel-Bite Lesions (Lesioni da morso di cammello) *Minerva med.*, 1941, 32, 149.

Camel-bite lesions, of which there is no record in the literature, are of particular interest because they have definite and distinctive characteristics and often result in fatal infection. In describing the characteristics of the camel, the author directs attention to the fact that camels are especially ferocious during the mating season, at which time most bites occur. A description of the camel's dental structure is given.

The camel bite produces two types of lesions. In one type there is an injury of the soft tissues as well as a crushed comminuted fracture with one or more fragments. The second is a much more extensive contused laceration with a fracture produced by spiral torsion and separation of the fragments. These lesions are especially dangerous because they may become infected from micro-organisms such as the bacillus perfringens, bacillus oedematis, and vibrio septique which are found in the camel's mouth. Because of interruption to the blood supply of the affected part and the presence of these organisms, gas gangrene is frequent. The prognosis is the same as for most compound fractures, and healing is slow. The treatment consists in the reduction and immobilization of the fracture, and the prevention or control of infection.

The author presents 6 cases illustrating lesions varying from a simple lacerated contused wound to extensive injury which necessitated amputation. All 6 cases occurred during the mating season. There were 5 lesions of the upper extremity and 1 of the lower. Two of the bites proved fatal from gas gangrene. MICHAEL DEBAKEY, M.D.

Hawking, F. Local Concentration of Sulfonamide Compounds Inserted into Wounds; Maximum Concentration in Wound Fluids, Concentration in Distal Parts of a Wound and in Tissues Around a Wound. *Lancet* 1941, 240, 786.

The author studied the local action of the sulfonamide drugs in experimentally produced wounds. He

The author was unable to save animals given procaine intravenously by the intravenous administration of coramine or metrazol.

The author then discusses the reactions to local anesthetic agents in regard to their character, prevention, and treatment, and describes some illustrative cases which have occurred in the Johns Hopkins Hospital.

For nerve blocking and local infiltration there is general agreement that procaine is reliable, effective, and the safest of all the local anesthetic agents. Cocaine and the entire group of cocaine-like anesthetics are similar in so far as the type of reaction which they may evoke, although they differ in the frequency with which their use is attended by such an untoward effect.

The reactions may be divided into two types first, those presumably dependent upon true hypersensitivity of the patient to the drug, and, second, those resulting from absorption of a toxic dose. The reaction due to hypersensitivity may consist of wheezing, labored breathing, feeling of tightness in the mediastinum, a weak and rapid pulse, and prostration. In some cases local pain, tenderness, erythema, and induration at the site of injection may constitute a reaction dependent upon sensitivity to the local anesthetic drug employed, since needle puncture without the use of a local anesthetic did not produce any local reaction.

The reactions which are ascribed to a toxic dose may be mild or severe. In the mild reactions there may be restlessness, palpitations, perspiration, pallor, loquacity, nausea, and tremor. There is good evidence that the incidence of such reactions may be substantially reduced by preliminary medication with one of the barbiturates and that the reactions may likewise be successfully treated with barbiturates. The severer reactions are generally divided into two groups, one characterized by convulsions and respiratory failure, the other by sudden collapse. In the former there may be apprehension, excitement, delirium, and dyspnea. There are always convulsions, and death is ordinarily said to be respiratory in type. The second group is associated with sudden pallor, tachycardia, fainting, and shock. Cardiac and respiratory failure occurs very rapidly. The author is not entirely certain that death in the first type is primarily due to respiratory and in the second to cardiac failure, as is commonly believed. The barbiturates are apparently effective prophylactically and therapeutically in the first type of reaction, but of no value in the second.

These reactions are exemplified by several cases cited by the author in which various local anesthetics were used, namely, cocaine, butyn, and procaine.

It is impossible to state what constitutes a "safe" dose. It has been reported in the literature that doses as little as 30, 20, and even 12.5 mgm have resulted in fatalities. On the other hand, doses as large as 1,500 mgm of procaine in 0.5 or 1 per cent solution, and 3,000 mgm of 0.5 per cent novocaine

have been used clinically without reaction. It is therefore apparent that the "safe" dose is unknown and that what in the majority of cases is a safe dose may in a rare instance prove fatal. In addition to the route of administration and rapidity of absorption which influence toxicity, it is clear that in certain fatalities a true idiosyncrasy must occasionally be taken into consideration.

In conclusion, the author states that cocaine should never be given by injection. Urethral instillation of an anesthetic should not be made in the presence of trauma. Procaine is probably the most satisfactory anesthetic for infiltration or nerve block.

All anesthetics should be used in as dilute solution as is satisfactory, procaine should probably not be used in concentration greater than 1 per cent. Injections should be made slowly and with care to avoid injection into the blood stream, an anesthetic should not be injected directly into the pleural cavity, and extreme care should be exercised as to the quantity of the anesthetic used in paravertebral injections. It should be kept in mind that the fatal dose may be less in elderly and very ill patients and those with poor circulation and reduced liver function. Large amounts of local anesthetics should not be used in supplementing general anesthesia.

One of the barbiturates should be used as preliminary medication. If a reaction occurs which seems predominantly convulsive in character, and particularly if its onset suggests relatively slow absorption of the anesthetic, an intravenous injection of one of the barbiturates should be made. Those reactions which come on rapidly and are associated with early collapse should probably be treated with the intravenous injection of adrenalin and of one of the cardiorespiratory stimulants such as coramine or metrazol. If the pulse has disappeared, the injection should be made into the heart. If the respirations are compromised, artificial respiration and oxygen inhalation should be begun immediately.

SAMUEL H. KLEIN, M.D.

Bailey, H. Cardiac Massage for Impending Death under Anesthesia. *Brit M J*, 1941, 2, 84.

To set the heart beating when during general anesthesia it has suddenly and unexpectedly become still indeed calls for a clear-cut plan of action, for it ranks even higher than the arrest of serious arterial hemorrhage as an urgent surgical emergency.

The special point to raise is that cardiac massage should be resorted to earlier. If the abdomen is open, massage can be resorted to sooner than otherwise would be the case. To be permanently effective, cardiac massage must be instituted within three and a half to four and a half minutes. With but three to three and a half minutes each member of the operating team must know his or her duty. A junior nurse should be detailed to cry loudly each passing minute from the time the anesthetist sounds the warning note of danger.

Artificial respiration must be started at once, and continued throughout the endeavor. Intratracheal

insufflation of oxygen and carbon dioxide is the ideal form of artificial respiration. Syl ester's method is efficient if the airway is kept clear.

The surgeon makes an incision in the midline through the linea alba large enough to insert the hand and starts cardiac massage from below the diaphragm at first with a quick forcible movement for half a minute—the base of the left hand over the lower thorax aiding in the maneuver. If there is no response after thirty seconds the movement should be changed to a slower rate of about eighty per minute. A nurse fills a syringe with 1 c.c. of adrenalin and injects it into the heart. Immediately afterward massage is continued. If there is no success the surgeon detaches the diaphragm from the left costal margin with a stroke of the scalpel and the opening is stretched to take the hand; he then rhythmically squeezes the heart within the pericardium. If the last maneuver is successful the opening in the diaphragm must be closed with catgut stitches.

Since Darling and Lane published the first successful case in 1902 only 50 permanently successful cases have appeared in the literature.

GEO. G. A. COLETT, M.D.

Schnedorf, J. G., Lorhan, P. H., and Orr, T. G.
The Problem of Anoxia in Surgery and Anesthesia. Report of Experimental and Clinical Cases and Review of the Literature. *A. S. S.*
94: 43, 1939.

On the basis of the experimental evidence certain conclusions are justified regarding the treatment of anoxia in the surgical patient. Anoxemia can best be treated by prevention. The hemoglobin level of

every patient to be operated on should be checked. Anemic anoxemia should be prevented by adequate preoperative treatment and blood transfusions. The hemostasis and the operative technique should be such as to prevent the unnecessary loss of large quantities of blood and the development of shock at the time of operation. In extensive operations 600 to 1,000 c.c. of blood should be given during the operation.

Even when an effective level of blood hemoglobin is maintained the surgeon and the anesthetist should exercise care in the selection of the preoperative sedatives. In many instances verbal reassurance is far better than small doses of barbiturates in allaying the fears of the patient. If barbiturates are used only small doses should be given.

From the standpoint of anoxemia only the degree of anesthesia necessary to perform the operation painlessly should be used and those anesthetic agents which do not produce anoxemia should be given preference. Oxygen should be used in combination with the anesthetics which are known to produce mild or severe anoxemia.

If anoxemia and shock develop a moderate Trendelenburg position, inhalations of high concentrations of oxygen, artificial respiration and cardiac and respiratory stimulants should be given. Neosynephrin and epinephrine are of great value in restoring the blood pressure but subsequent precautions should be taken not to overload the system with intravenous fluids because of the transient anuria produced by these drugs. It should be remembered that oxygen therapy is indicated long before cyanosis is present and long after it has disappeared.

SAMUEL KAHN, M.D.

PHYSICO-CHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Wallén, L. The Roentgen Diagnosis of Gall-Stone Ileus (Zur Roentgend Diagnose von Gallensteinileus) *Uppsala Lakaref Forh*, 1940-41, 46 59

The diagnosis of gall-stone ileus solely by clinical methods is difficult and uncertain because cholelithiasis, with or without clinical signs, is of common occurrence and ileus may be caused by a variety of conditions. Moreover, a cholecystoduodenal fistula, which is apparently the usual path of exit of the stone from the gall bladder to the intestine, frequently occurs without particularly striking symptoms.

In recent years, the roentgenological diagnosis of gall-stone ileus has aroused great interest and the literature contains an increasing number of contributions to this method of examination.

The route of the stone from the gall bladder to the intestine varies. Judd and Burden's series of 153 biliary fistulas include 6 to the stomach, and 26 to the duodenum, 4 to the duodenum and colon, and 26 to the colon only. In 148 of these cases the fistula proceeded from the gall bladder, in 1 from the ductus choledochus, and in 4 cases from the cystic duct. The author believes that the cause of the obstruction consists chiefly in the disparity between the size of the stone and that of the lumen of the intestine. The local inflammatory reaction, caused by the irritation of the intestinal wall, may be a contributing cause.

The author presents 22 cases of gall-stone ileus collected from the literature and 2 cases from his own practice. In all of these cases the diagnosis was made by roentgen examination. In 5 a positive shadow of the stone was shown. In 8, corroboratory evidence of biliary fistula was found by means of air or contrast filling of the gall bladder or bile passages. In the remaining 11 cases, the diagnosis was based upon a filling defect as shown by contrast media administered by mouth, and the site of obstruction was determined. In the 24 cases presented, 10 patients died. These cases were examined and treated in the period from 1926 to 1940, inclusive.

The clinical picture of gall-stone ileus presented by these cases was extremely variable. From the history and clinical examination alone one could only suspect the nature of the malady. In most instances the roentgen examination is decisive, it should be made promptly in every abdominal case of uncertain nature.

The author discusses the principal roentgenological signs of gall-stone ileus. On the flat film, without contrast media, the findings may vary greatly—from the total absence of signs to the complete picture with fluid levels, intestinal coils distended with gas and fluid, and other characteristic features. A positive stone shadow is rarely found. A prerequisite for its appearance is a sufficient cal-

cium content of the stone. According to Lowman and Wissing, most cases of gall-stone ileus are caused by calcium stones, and perforation of the gall bladder is a result of chronic involutionary changes, during which there has been a sufficient deposit of calcium to render the stones radiopaque. The demonstration of signs of internal biliary fistula is confirmative evidence but not positive proof of gall-stone ileus.

The author recommends further roentgenological examination with the administration by mouth of small amounts (1 or 2 tablespoonfuls) of contrast medium. If ileus is found, with distended coils of small intestine, immediate operation may be performed if indicated and the patient's condition permits. If continued examination is permissible, the obstruction may be gradually determined and localized. This method is especially valuable for diagnosis when the obstruction is in the upper portions of the alimentary canal, pylorus, duodenum, or upper jejunum, where, by proper technique, the obstruction may be easily reached by the contrast medium. By this technique also, an otherwise invisible concretion may appear as a negative shadow in the contrast medium.

J M SALMON, M D

Howes, W E, and Schenck, S G. Roentgenological Considerations in the Diagnosis and Treatment of Primary Malignant Bone Tumors *Radiology*, 1941, 37 18

This communication is presented as an analysis of 40 cases of proved primary malignant tumors of bone which have come to the authors' personal attention. They are tabulated according to Ewing's revised classification. The cases have been studied and are given consideration from the standpoint of (1) age and sex, (2) history of the disease, including such data as (a) relation to trauma and (b) duration of symptoms, (3) physical examination, (4) laboratory data, (5) classification into pathological types, (6) clinical diagnosis, (7) roentgen diagnosis with special consideration of (a) its limitations and (b) its accuracy, (8) management or treatment, and (9) results.

Roentgen study is considered of paramount importance in the diagnosis, and a summary of the characteristics of each type of tumor, with numerous illustrative roentgenograms, is included. Difficulties in differential diagnosis are discussed in detail. As regards the accuracy of roentgen diagnosis in the 40 reported cases, this diagnosis was in agreement with the final diagnosis in 33 cases. The correlation is tabulated.

Treatment included excision, amputation, excision and irradiation, pre-operative irradiation and amputation, and irradiation. The factors used for irradiation are mentioned. Tables are included to show the results obtained. Statistical analysis of the end-results revealed that of the 35 patients treated,

26 were benefited for periods varying from one month to four and a half years. 9 showed no clinical improvement. 13 were alive at the time of this report and their survival period together with diagnosis and the treatment given is tabulated. The survival period of 23 fatal cases is also given.

In the conclusion it is stated that the results from radical surgery alone were disappointing. The best results were obtained in those cases which received irradiation usually in conjunction with surgery.

ADOLPH HARTUNG M.D.

Camp J D and McCullough J A L Pseudo-fractures in Diseases Affecting the Skeletal System. *Radiology* 1941 36 65

Pseudofractures representing transverse zones of rarefaction of various widths and usually occurring in symmetrical form in different parts of the osseous skeleton are often mistaken for true fractures or are erroneously interpreted. A review of the literature revealed that several investigators went so far as to consider them a new disease entity while others applied an array of impossible names for their classification such as Looser's zones, umbauzonen, umbaufracturen, multiplespontaneous diopathic symmetrical fractures and insufficiency fractures.

The authors after a study of the material of 79 publications and including their own cases express the opinion that pseudofractures may be encountered in association with a variety of condition not closely related in which the bone is weakened or that they may occur in apparently healthy bones which have been subjected to excessive strain. Accordingly they do not constitute a new disease entity.

Roentgenographically the skeletal defects may show 3 different forms: (1) those associated with certain malacia in which there is a small subperiosteal notch in the beginning which gradually gives place to a band of decalcification and finally appears as if the lime salts had been erased in that area without disturbance of the continuity of the rest of the bone; (2) those not associated with malacia in which fine cracks or fissures usually extending through the convex surface of the cortex of curved bones constitute the main changes; and (3) those in which a fusiform callus formation with periosteal reaction but without crack or a zone of decalcification is the only manifest sign.

All these defects differ from true fractures in several respects. As a rule they develop spontaneously without gross trauma but gross trauma may convert them into true fractures. Although most of them appear on the roentgenograms as discontinuities of bone there is no separation or rotation of the apparent fragment and clinically there is no crepitation or undue mobility present except perhaps a slight elastic give on more forceful exertion.

Considerable discussion has arisen in the literature regarding the mechanics of the production of pseudo-fractures. It is significant in this respect that pseudo-fractures are always associated with conditions in which a weakened bone or in which bones are subjected

to strains to which they are not adapted. It is also significant that those bones which are subjected to the greatest stresses are the ones most frequently involved. Finally the symmetrical distribution constitutes the most positive proof of the excessive strain theory since undue strain over a long time is more apt to be exercised on both of the paired bones than on a single one.

Several roentgenographic illustrations showing rather rare types of pseudo-fractures are included.

T. LUCURIA M.D.

Knutsson F Roentgenology of the Femoropatellar Articulation and a Good Projection of the Knee (Ueber die Röntgenologie der Femoropatellargelenke als eine gute Projektion für die Kniegelenke). *Acta radiol.* 1941 22 371

A complete x-ray examination of the patella consists of frontal and profile view as well as an axial projection. According to the customary technique the axial projection of the patella is obtained with the knee articulation in a strong flexion position. None of the customary methods with the patient in a prone or supine position allows an estimation of the thickness of the cartilage. Furthermore the projections do not permit an opinion concerning the facies patellaris femoris.

The author recommends a new axial projection of the femoropatellar articulation in a slight flexion position. The method is applicable even in cases with limited flexion because a bending of the knee not exceeding from 130 to 150 degrees is required. Moreover the position of the patella in the facies patellaris may be appraised and slight subluxations may be detected. The patient is placed in a supine position with the knee flexed between 30 and 150 degrees. The x-ray tube is placed above the corresponding shoulder of the patient and the cassette is kept in a vertical position over the lower leg at a certain distance from the patella.

This method allows a detection of alterations due to deforming arthritis.

JOSEPH K. NATA M.D.

Caubarrère N L and Cassinoni M Roentgenotherapy of Inflammatory Processes (Röntgentherapie der entzündlichen Prozesse). *Fachdienst für Röntgenologie* 1941 6 33

X-rays were occasionally used in the treatment of inflammation almost from the time of their discovery but it was not until 1924 with the work of Heidenhain and Fried who described 54 cases before the German Surgical Society that this method of treatment was systematized and quite generally adopted. The author reviews the roentgen treatment of inflammations of the different tissues and systems of the body giving brief details as to technique and quoting the results obtained by different workers.

In general the more acute the inflammation the smaller the dose. In very acute cases the dose may vary from 100 roentgen to 1/10 roentgen. It is better to err in the direction of giving an insufficient dose than of giving too large a one. If it becomes

PHYSICO-CHEMICAL METHODS IN SURGERY

necessary to give another treatment because the first one has not been effective it should always be smaller than the interval between doses is not four or five days. The possibility of giving a harmful dose is the greater the more acute the infection. If the radiation is effective there is an almost immediate reaction.

Failures in the roentgen treatment of inflammations are generally caused by improper technique or the fact that an inflammation is so deep seated that evacuation of pus is impossible. Or they may be due to severe bone lesions or recurrence of the condition, as in furunculosis, so that the system becomes habituated and temporarily insensitive to the rays.

A discussion is given of the mechanism of action of the rays on the tissues. There are apparently four essential factors: action of the rays on the local circulation, necrobiotic action on the cells of the infiltrated tissue, action on phagocytosis, and action on the reticulo-endothelial system.

Roentgen treatment may be associated with various other methods of treatment, such as the use of vaccine, bacteriophages, and chemical agents such as sulfanilamide. Some authors have claimed that there is an antagonism between the latter remedies and roentgen irradiation, but the present authors do not believe that this is true if the irradiation is given only first and the sulfanilamide medication is given maximum after the effect of the rays has reached its maximum.

Irradiation should never be given in cases in which sulfanilamide has caused intense cyanosis. On the whole, the authors conclude that irradiation is not a panacea in all inflammations, but that its use on the proper indications should not be discouraged. The possibilities should be considered individually in each case, and this necessitates close co-operation between the clinician and the roentgenologist.

AUDREY G. MORGAN, M.D.

DeHollander, W. Roentgen Irradiation of Cellulitis, Especially of the Face and Neck. *Am J Roentgenol*, 1941, 45, 831.

A brief historical review of roentgen irradiation of inflammatory lesions and the manner in which it arrests such lesions prefaces the author's experiences in a series of cases of cellulitis of the face and neck so treated. The origin of such cases and their clinical course are discussed, and the usual results with medical or surgical treatment are contrasted with the effects of irradiation. In the 18 cases observed, response was satisfactory and resulted in cure except in 1 case. Early resolution or liquefaction occurred with relief of the pain and decrease of the swelling in from twenty-four to forty-eight hours, as well as coincident improvement in the general condition. Detailed reports of the cases are included and the results obtained are tabulated.

As regards technique, roentgens, measured in air, were given over one or two fields according to the size of the area involved. The factors used were 135 kv (peak), 5 ma, 35 cm focus skin distance,

and 3 mm of aluminum filter. After forty-eight hours 193 additional roentgens were given. The following conclusions are appended.

- 1 The treatment of choice in cellulitis is irradiation. This shortens the illness because protective substances are liberated from the destroyed leucocytes, which causes early resolution.
- 2 Relief of pain occurs soon after irradiation and is of great benefit to the patient mentally and physically. This relief of pain occurs when either resolution or liquefaction takes place. The early liquefaction of the area may necessitate small incisions to give drainage.

- 3 No extensive surgical incision is necessary. If an area goes on to fluctuation and pus formation, from one to three small incisions to allow drainage may be necessary.
- 4 The temperature decreases in a few days as resolution occurs.

- 5 The toxicity of the patient decreases because of absorption of the liberated protective substance as the blood becomes bactericidal.
- 6 Hospitalization is at a minimum as many cases may be treated as out-patients.

ADOLPH HARTUNG, M.D.

Angevine, D. M., and Tuggle, A. The Effect of Roentgen Therapy upon Infections Produced in the Skin of Rabbits with Cultures of the Streptococcus Hemolyticus and Staphylococcus Aureus. *Am J Roentgenol*, 1941, 46, 96.

After reviewing the literature the authors came to the conclusion that no one had studied the effect of roentgen rays on bacteria *in vivo* by quantitative or roentgen methods. They undertook the study of a group of animals to determine the effect of local irradiation upon relatively small skin abscesses produced by the avirulent and virulent hemolytic staphylococcus and also by staphylococcus aureus. In the majority of animals the number of bacteria in the skin lesions and the adjacent lymph nodes was determined when they were killed at various intervals after injection.

The conclusion is reached that irradiation of the skin before an infection has no effect upon the course of subsequent hemolytic streptococcus infections. In animals irradiated after infection, necrosis developed earlier in treated than in non-treated lesions. The effect of roentgen treatment on experimental skin infections was to increase the size of the lesions, produce more necrosis, and increase the invasive character of the bacteria.

HAROLD C. OCHSNER, M.D.

Gallavresi, L., and Natale, P. Statistical Studies on the Value of Roentgen Therapy by the Method of Coutard in the Treatment of Cancer of the Uterus (Considerazioni statistiche sul valore della roentgenterapia ad alte dosi frazionate [metodo del Coutard] nel trattamento del cancro dell'utero). *Radiol med*, 1941, 28, 195.

The author presents the results of the treatment of uterine cancer by the fractionated high dosage

technique of Coutard and contrasts this method with the method of roentgen therapy formerly practiced. Both methods require preliminary treatment with radium which is introduced into the cervical canal first a 10 mgm capsule which is followed by one of 5 mgm filtered with 1 mm of lead. Two capsules of 10 mgm each are in place at the same time in the fornices which gives a total of 35 mgm of radium. This is allowed to remain in place for seven days. In the older technique roentgen therapy was then applied through three portals: one hypogastric and two parasacral each portal receiving 300 roentgens at a sitting and each field measuring 15 by 15 cm. One treatment was given daily the three fields being alternated as convenient. The factors employed were 160 kv filtration of copper (0.5 mm) plus aluminum (3 mm) a focal distance of 40 cm and a current of 3 ma which gave illumination of 8 roentgens per minute at the level of the skin.

According to the method of Coutard two portals of irradiation were employed the hypogastric and sacral which covered an area varying from 225 to 400 sq cm. In two consecutive sittings one in the morning and the second in the afternoon 150 roentgens were given. This was continued until 140 sittings with a total dose of 6000 roentgens were completed. The factors employed were from 170 to 180 kv filtration of copper (1 mm) plus aluminum (3 mm) a half value layer of 1.2 mm of copper a focal distance of 50 cm and a current of 3 ma which gave illumination of 4.2 roentgens per minute at the plane of incidence.

The total number of patients treated was 759 of which 399 received the Coutard method. The results are compiled according to the location of the lesion in the corpus of the uterus the cervical canal or the external os and according to the grade of malignancy. The cases cured are judged on a basis of five years. When all four grades of malignancy are taken together it is found that 36 per cent of the cases subjected to the technique of Coutard were treated successfully as against 29.7 per cent which were treated by the older method. Among the recurrences 35.1 per cent were cured by the Coutard method and 17.5 per cent by the former method.

EDITH FARNSWORTH M.D.

Gluecksmann A. Preliminary Observations on the Quantitative Examination of Human Biopsy Material Taken from Irradiated Carcinomas. *Br J Radiol* 94 4 87

At the Strangeways Laboratory of Cambridge England repeated attempts have been made since 1935 to express quantitatively the biological response to radiation both of normal and malignant cells. The experimental results indicated that the response was essentially the same whether the irradiation was done *in vivo* or *in vitro*.

The author in the present article gives a preliminary report of the more recent investigations which were carried out in human beings with the purpose of determining whether biopsy could be used rou-

tinely for the quantitative evaluation along the lines of the previous work on embryonic animal tissues. The material was obtained from various hospital cases using widely different radiotherapeutic methods but so far only squamous and basal cell carcinomas have been studied and the observations have been restricted to primary neoplasms.

Briefly the method consisted of counting the entire cell population of selected young areas in biopsy taken at various intervals such as (1) immediately before radiation (control) (2) immediately after irradiation if exposure was longer than six hours and eighty minutes after irradiation if exposure was six hours or less (3) twenty four hours after exposure (4) seven days after exposure (5) fourteen days after exposure and (6) one month after exposure.

All of the cells in the selected areas were classified under four categories:

1. Dividing cells from the earliest recognizable prophase to the separation of the daughter cells whether the division was normal or abnormal.

2. Degenerate cells (a) cells showing primary nuclear disintegration i.e. chromatopycnosis hyperchromatosis or chromatolysis and (b) cells showing nuclear degeneration secondary to degenerative changes in the cytoplasm as for example cells in the final stages of keratinization. Most of the former were the result of abnormal mitotic division whereas the latter represented advanced stages of resting and differentiating cells.

3. Resting cells non dividing cell which are not differentiating.

4. Differentiating cells (a) cells in the process of keratinization recognizable by alteration in the structure of their cytoplasm with a corresponding change in the staining reactions and (b) cells showing an increase in size.

By plotting the relative percentages of all these cells against time on a graph it has been found that although Broder's gradings were useful in helping to classify the original biopsy the curves expressing the viability of the individual malignant cells rather than the degree of differentiation were of greater aid later. Moreover the cases studied so far have shown certain characteristics by which the effectiveness of the irradiation can be judged with greater accuracy than was hitherto possible.

The method will be subjected to future test on a large scale. T. LEUCUTIA M.D.

Henhaw P.S. The Induction of Multipolar Cell Division with X Rays and Its Possible Significance. *Radiology* 94 36 717

During the past few years the author subjected various kinds of sperm and ova to irradiation and observed the alterations in the processes of fertilization cell division and development. In the present article he describes certain abnormalities of cell division which may have some bearing on the apparent paradox that irradiation causes cell death in one case and neoplastic or malignant growth in the other.

PHYSICO-CHEMICAL METHODS IN SURGERY

These abnormalities of cell division consist chiefly of multipolar cleavage. They were noted clearly in abundance during the midsummer in certain marine stations. If the eggs of such sea urchins are properly fertilized, practically 100 per cent of the cells divide to form two equal blastomeres. However, if either of the gametes is adequately irradiated before the fertilization, the cleavage becomes multipolar. Several facts about the activity which follows the irradiation of the gametes are noteworthy.

1 Even doses as large as 50,000 roentgens or more of γ rays fail to destroy the motility of the sperm so that the act of fertilization occurs as normally as though no radiation had been applied.

2 Multipolar cleavage may result from the irradiation of either gamete alone. Inasmuch as the mature sperm cell consists almost entirely of nuclear material, this signifies that the multipolar cell division may be attributed to alterations produced by the irradiation in the nucleus.

3 In an attempt to determine the cause of multipolar cleavage, it was observed that certain of the daughter cells, and probably all, failed to receive a full complement of hereditary materials. The chromatin which in control cells was evenly distributed between two daughter cells appeared in the irradiated cells unevenly distributed among more than two. Since in the zygotes, of which the sperm or ova had received large doses of radiation, more than two asters developed, giving rise to accessory poles, the chromatin was drawn not to two poles as normally, but to more than two. This, then, suggests that irradiation produces a change in the nuclear elements which affects the formation of accessory asters and that these, in turn, are responsible for multipolar division resulting in cells with chromatin deficiency.

In considering the hereditary elements, it is believed that they represent specific entities located in linear arrangement along the chromosomes in a manner resembling beads on a string. Each entity or gene may exert an influence on the course of life. Obviously, multipolar cells in which parts or whole chromosomes are absent exhibit deficiency in hereditary elements and, since certain vital genes may have been lost, the daughter cells may continue to proliferate for a while, but eventually they will die. Thus this is one way, although perhaps not the most important, by which irradiation produces death in cells.

However, the hereditary elements are in some way involved also in the process of induction of cancer. The author goes to great length in explaining the mechanism of action of the carcinogens and expresses the opinion that the malignancy-inducing agents act indirectly through their influence in calling into play hereditary factors which would otherwise be dormant. Thus, since radiation is known to cause cancer and also to disturb the hereditary set-up through the induction of multipolar cleavage, one may point to the production of cancer by radiation. In other

words, irradiation, by the same mechanism, may cause cell death on the one hand, and malignant growth on the other.

T LEUCUTIA, M D

RADIUM

Fricke, R E The Treatment of Non-Malignant Conditions with Radium *Med Clin North Am*, 1941, 25 945

Non-malignant conditions that respond favorably to irradiation may be grouped as benign tumors and as acute or chronic inflammatory processes. Some of these lesions occur frequently, others are extremely rare. At the Mayo Clinic, the percentage of patients treated with radium for benign conditions compared with that of those treated for malignant processes has increased from 33 per cent in 1932 to 43 per cent in 1939.

Treatment with radium of all benign lesions, whether neoplastic or inflammatory, necessitates certain precautions. Most of these conditions are not fatal if not treated. By overtreatment, under-filtration of the radium, or lack of protection to the adjoining tissues, a benign condition may be changed into a malignant one. Unskilled treatment may cause serious damage to the skin and underlying tissues which necessitates surgical repair. To the patient, treatment with radium often is considered just treatment with radium, he has heard of marvelous cures and expects the same, with no thought as to the experience or the equipment of the radiologist. Although the patient will eventually learn that skill and experience are as important to a radiologist as to a surgeon, a saving factor is that of dosage in the treatment of benign disease. Good results can be achieved in all the benign conditions mentioned, although some are serious conditions. However, in all these lesions only a percentage of the dose used in the treatment of carcinoma need be employed. The dosage used is never a full erythema dose.

MISCELLANEOUS

Denstad, T The Radiosensitivity of the Bone Marrow (Die Strahlensensibilität des Knochenmarks) *Acta radiol*, 1941, 22 347

The radiosensitivity of the bone marrow has been the subject of much animal experimentation since 1903, when Heinecke began his fundamental research work. This is because of the increasing use of radiotherapy and the importance of a knowledge of the blood changes in the general reaction of the organism to roentgen and radium irradiation. Above all, an accurate conception of the reaction of the blood-making organs, particularly of the bone marrow, is essential to the rational use of irradiation in the treatment of the various blood diseases. The bone marrow, with its two well defined types of cells, the erythropoietic and the myelopoietic, and each with its continuous development from immature to mature forms, is an ideal field for biological investigation of the nature and action of radiotherapy.

The author reviews the results of the most important earlier experiments in this field. These were based upon animal experimentation and were in part contradictory. The author believes that the results of these experiments cannot be applied to human beings. Normally there is a wide variation in the leucocyte count of animals. Moreover, most of the specimens of bone marrow were taken post mortem and were affected by rapidly developing autolysis and other changes which vitiated the results. There was also valid objection to the necessary trauma of repeated spinal puncture and to section preparations.

In man no systematic investigation has been made of the radiosensitivity of the bone marrow. Our information on this subject is derived from observation at autopsy when the usual post mortem changes are present or from isolated sternal punctures during life in patients who have had roentgen therapy because of mediastinal or similar types of tumors.

A study of the results of such imperfect investigation indicates great radiosensitivity of the erythropoietic and myelopoietic cell systems and also of the large nucleated giant cells. Hypoplasia develops proportionately with the size of the roentgen dosage administered but the changes become permanent only after very large doses. The comparative sensitivity of the two cell systems, also the behavior of the myeloblasts, is not definitely stated.

The author proceeds to discuss the results of his own experiments which were conducted on patients receiving radiotherapy for malignant tumors. The general condition of these patients was compara-

tively good; they had no anemia or evidence of general metastasis. The treatment was mostly by hard rays (175 kv, 4 ma, filtered through 2 mm of copper and 3.5 mm of aluminum with 60 cm distance). By aspiration small quantities of marrow were obtained from sternal puncture with minimal blood admixture. Smears were made and tested with the May-Gruenewald-Giemsa stain. Eleven cases are reported: 2 treated with small roentgen doses, 4 with large doses, 2 with large doses of roentgen therapy, and 3 with total roentgen irradiation.

In all of these investigations one is impressed by the great radiosensitivity of the red bone marrow. Definite changes are observed even after small doses. The youngest cells are the first to disappear. The myeloblasts are not particularly resistant. Erythropoiesis seems to be more influenced than myelopoiesis; erythropoiesis is more active even in the erythroblasts. In specimens of the irradiated marrow are found evidences of cell degeneration in the form of vacuoles in the protoplasm and nucleus. There is remarkable regeneration of the marrow. Red cells and hemoglobin are little affected. The cases of extensive metastasis illustrate the reaction of the bone marrow to total irradiation. Evidently the leucopenia present is the result of an inhibitive action upon hematopoiesis. This effect is also observed in leukemia. The hypothesis of an inhibition of the bone marrow also explains the fact that the results of irradiation are unsatisfactory in a degree proportionate to the immaturity of the blood picture, and that excessive irradiation may convert a mature myeloid leukemia into an immature myeloblastic leukemia.

J. M. SALMON, M.D.

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Stenstrom, T. Foot and Mouth Disease in Man in the Light of the Most Recent Research (Die Klinik der Maul- und Klauenseuche beim Menschen im Lichte der jungsten Forschung) *Acta med Scand*, 1941, 107 372

After stating the various reasons for doubting human susceptibility to foot and mouth disease, the author claims that at present the negative theory is no longer tenable. The uncertainty, during the last decade, was obviated by successful inoculations of guinea pigs and by scientific observations of the disease in man. To fix definitely the accuracy of susceptibility, various physicians inoculated themselves with the virus obtained from the serum found in the blisters of infected animals, and from the serum found in infected human beings. The course of the disease in these instances was classical, hence, the proof is positive. Stenstrom reports the histories of 8 patients definitely infected by the virus of foot and mouth disease and includes the clinical history of his own patient, giving symptoms, serology, and all the indicated laboratory tests in detail. In order to portray the clinical picture of foot and mouth disease in man, the author appended the case history of a patient treated in his clinic.

A twenty-four year old female was employed as a milker. On November 24 foot and mouth disease was found in the dairy where she worked. Investigators found the udders and teats of the cows grossly involved in the infection. On November 27 the patient became ill, suffering from headache, lassitude, chills, and fever. Her temperature was not taken, although she felt feverish and complained of pains in the neck, difficulty in deglutition, and a burning sensation in the palmar surfaces of both hands. The next day, blisters appeared on her hands. She felt better and returned to her work. In the meantime, the patient felt well excepting for a painful throat and the burning sensation in the hands and the sole of her left foot.

On November 30 she was hospitalized. Her general condition was good. She was found to have albuminuria, her hemoglobin was 83 per cent, red-cell count 4,120,000, and white-cell count 5,000. She was afebrile, and her throat and gums were highly inflamed and covered with mucus. Her tonsils were moderately enlarged and showed many pimple-like elevations. There were no blisters in the mouth. Many lymph nodes the size of peas and up to that of hazel-nuts, were found in the neck. The skin of the finger-tips was tense and fluctuated on touch, but no definite blisters were present. The volar surface of the fingers were punctured by 8 bean-sized blisters surrounded by zones of inflammation. The content of the blisters was serous, clear, and slightly

yellowish. Microscopically, leucocytes were found in moderate and lymphocytes in lesser numbers, but no bacteria were found. The fingernails were very sensitive to touch, especially when pressed laterally. The left foot showed metatarsal inflammation and was very painful to touch.

On December 1 there had been some regression of the skin manifestations—the blisters had dried out.

On December 2 the throat was less inflamed, but there was still some tonsillar involvement. Numerous pneumococci and a few leucocytes (stab) were found in the throat smear. The redness of the hands and left foot greatly faded, the tense condition and the glare of the skin were reduced, but they did not entirely disappear. The red areas surrounding the blisters faded. The fingernails were still very painful to touch.

On December 5 the patient complained of pain in the posterior parts of the legs which she had had ever since December 2, when she had a severe attack of nausea and vomiting. There were no symptoms of pains in the neck, but on bending forward severe pains of the entire spine were induced. On lumbar puncture the Nonne and Pandey tests were negative, the lymphocytes numbered 21, the leucocytes 0/mm³. The Wassermann reaction was negative, the temperature normal, S R 10/Stde, and the albumin 0.

On December 7 the blisters were entirely dried out, they were of yellowish brown color and still very sensitive to pressure. Otherwise there were no pressure pains of the hands and feet.

On December 8 a severe headache was experienced but no leg pains. The blisters left dark brown spots in the skin, and a delicate new skin formed in the areas which were denuded by the blisters that dropped off.

On December 15 the patient had no complaints for several days. The blisters were gone and left no cicatrices. There were no neck symptoms, but when the head was inclined forward or the patient stretched her legs while sitting in bed, pains occurred in her back.

On December 23 the patient was subjectively and objectively symptomless and was discharged from hospital. She refused to undergo another lumbar puncture.

The incubation period was two days in 8 of the patients.

The temperatures were up to 39.4 degrees, but were normal in a few days, the last to return to normal required eight days.

Diarrhea occurred in 2 patients, bronchitis in 1. The most prominent symptom was a general exanthematous condition which was found after the virus got into the patient's blood, this made its appearance about two days after the general manifestations.

The sites of infection were wounds the gastro intestinal canal after the ingestion of uncooked milk the mucous membrane of the buccal cavity as in tonsillitis and pharyngitis

The complications in the first stage were bronchitis enterocolitis or albuminuria In the second stage mild meningitis

The prognosis is not always to be regarded as favorable

Usually the symptom course complications and sequelae in the patients studied were favorable nevertheless more cases must be studied before conclusions are acceptable **MATTHIAS J. SPIERTZ M.D.**

Lorenzo V. Postoperati e Fibrinolysis (La fibrinolisi postoperatoria) Riforma med. 1940 36 1589

Fibrinolysis means the dissolution and intimate persistence in a fluid state of a blood clot This occurrence was observed not only following sudden death from accident drowning or suicide but also in cases of surgical or toxic protein shock A frequent postoperative fibrinolysis in the first twenty-four hours after a surgical intervention has been demonstrated by Macfarlane and Imperati In this article Lorenzo gives an extensive personal contribution to the subject on the basis of 60 operative cases

The precipitation and the successive dissolution of a plasma clot obtained by mixing in a test tube (kept for twenty minutes in an incubator) 1 ccm of plasma 1 ccm of a 1.18 per cent calcium chloride solution and from 25 to 30 ccm of a physiological saline solution were noted in 9 per cent of the cases in which the blood was collected in the first hour after the operation The fibrinolysis occurred only in cases of major surgery The plasma clot did not show any change when the blood was collected before or twenty-four hours after the operation

The physicochemical interretention of postoperative fibrinolysis is that changes occur in the colloid equilibrium of the plasma from the reabsorption of the proteins derived from the traumatized tissues Interfering changes in the coagulation process have been demonstrated in some clinical or experimental conditions determined by the absorption or by the injection of heterologous or derived proteins as for instance in intestinal obstruction in extensive burns or in anaphylactic colloidoclastic or hemolytic shock A phase reaction would follow an extensive and rapid absorption of peptone like substances from the operative field In the first phase immediately following the surgical intervention a temporary blood incoagulability occurs as is demonstrated by the postoperative fibrinolysis In the next phase the fibrinolytic or fibrinoplastic the immunizing action of the peptone like substances would provoke an opposite change An abnormal duration of the fibrinolysis could perhaps be of some assistance in the prognosis of the postoperative course Therefore the duration should be exactly timed in a large number of different surgical cases

EMANUELE MONTICELLI M.D.

Reding R. An Attempt to Determine the General Conditions Predisposing to Cancer (Essai de détermination de l'état général d'un patient à cancer) A. J. 4 d. 1940 12 491

Reding reports a study of the modifications of blood chemistry and of the endocrine glands in a group of patients with cancer and a group of normal subjects of the same age group used as control In selecting the patients with cancer to be studied those were chosen who had shown no infection or hemorrhagic disease at the time when the tumor was first noted and in whom the tumor did not involve an endocrine gland and was not so located as to cause secondary changes by mechanical pressure or otherwise In the 6 patients with cancer it was found that (1) There was a definite increase in the polypeptide of the blood as compared with the normal (2) there was also an increase in the residual nitrogen and non-protein nitrogen of the blood and in the globulin and (3) the fibrinogen also showed a considerable increase The blood of the patients with cancer showed a higher degree of alkalinity than normal The determination of cholesterol by the digitonin method which precipitates only true cholesterol and several natural sterols closely allied to true cholesterol showed lower values in patients with cancer than in the controls With the colorimetric method however an increase was demonstrable in patients with cancer but this method demonstrates chemically allied substances other than true cholesterol In patients with cancer the increase in blood sugar following the ingestion of glucose was slower and less marked but an injection of insulin produced a greater degree of hypoglycemia—an indication of a disturbance of glycolysis and oxidation The endocrine glands in patients with cancer showed the following changes hypertrophy of the anterior lobe of the pituitary gland with diminution of the chromophile cells and increase of the chromophobe cells diminution of thyroid activity atrophy and sclerosis of the sex glands and hypertrophy of the islands of Langerhans of the pancreas Removal of the tumor did not alter these findings appreciably In patients showing precancerous lesions the same abnormalities in the blood chemistry were demonstrable

Experimentally it has been found that folliculins given in large doses is cancerogenic such doses of folliculin also produce the same changes in blood chemistry and in the endocrine glands as have been observed in patients with cancer Experiments on animals have also shown that injections of small doses of various complex proteins continued for a prolonged period were followed by the occurrence of malignant tumors in a much higher percentage of animals than in the controls the animals used in these experiments were of species and breeds not highly susceptible to cancer Theoretically many of the chemical changes observed in the blood of patients with cancer would favor the abnormal multiplication of cells such as the excess protein the alkalosis and the disturbances of glycolysis and oxidation It is also to be noted that Vidal who

employed the test of digestive hemoclasia as a test of the proteoepic function of the liver, found that this function was defective in certain families, he and his associates also found that the incidence of cancer is high in these families, and in all persons showing a deficient proteoepic function. This finding is in accord with the evidence of disturbed protein metabolism found by the authors in their patients with cancer. The observations reported are not regarded by the authors as in any way a solution of the etiology of cancer, they merely present some factors which have received little attention in the discussion of the genesis of cancer.

ALICE M. MEYERS

Spinelli, A., and Rohonci, G. The Influence of Heredity, Age, and Certain External Agents on the Pathogenesis of Malignant Tumors (Sull' importanza del fattore ereditario, dell' età e di alcuni fattori esterni nella etiologia dei tumori maligni). *Tumori*, 1941, 27: 85.

Although this article does not add anything new regarding the pathogenesis of malignant tumors, it is valuable for the large amount of cases reported (2,361 malignant tumors, from 1928 to 1938 in the Cancer Institute of Milan, Italy) and for the accuracy of the statistical data relating to certain etiological factors.

Concerning the relationship between age and the occurrence of tumors, only tumors of the connective tissue were discovered in patients younger than nine years of age. Epitheliomas were extremely rare between the ages of ten and nineteen years (only 1 case). The average age for sarcomas, thirty-two years, was therefore much lower than that for cancers, fifty-five and eight-tenths years.

The morbidity for malignant tumors increased with the age of the patient: it was 14.4 per thousand among those from fifty to fifty-nine years, 18.4 per thousand among those from sixty to sixty-nine years, 27 per thousand among those from seventy to seventy-nine years, and 29 per thousand among those beyond eighty years.

As for the transmission of hereditary factors, the presence of cancer was ascertained in a direct or collateral line in an average of 16 per cent of the cases (377 among 2,361), while the percentage was only 11.9 among patients selected as controls in the medical department of the University of Milan. However, the difference was not of real importance, because of the greater probability of errors in the anamnesis of patients taken as controls. Never have the authors met a "cancerous family."

The external factors showing a direct chronological relation to the appearance of tumors reached a higher percentage in the case of sarcomas. Single or repeated traumas were found in 2.5 per cent of the cancers, and in 8.4 per cent of the sarcomas. The period of latency was found to be much shorter for sarcomas.

Few cases of skin epitheliomas from tar, lead, or silver nitrate were described.

The statistical data showed a certain importance of prolonged mechanical irritations in the pathogenesis of lip and tongue carcinomas.

Syphilis was discovered in 8.8 per cent of carcinomas, strangely enough, it reached a percentage of 14 in the control group. Syphilis occurred, however, in a much higher percentage in certain localizations of the carcinoma: 8 per cent for the tongue, 10 per cent for the esophagus, 11.35 per cent for the stomach, 17 per cent for the pharynx, and 25 per cent for the lip.

Tobacco represented another important factor in the pathogenesis of certain tumors. The smoking or chewing habit figured in 87 per cent of the patients affected by carcinoma of the upper parts of the respiratory and digestive systems. Among 1,575 women with malignant tumors in the same period of time, only 54, or 3.4 per cent, were affected by cancers of these regions.

The exceptional occurrences of multiple malignant tumors in the same patient (only 17 cases, 0.67 per cent) speaks against a hypothetical cancerogenic constitution or disposition.

EMANUELE MOMIGLIANO, M.D.

GENERAL BACTERIAL, PROTOZOAN, AND PARASITIC INFECTIONS

Davis, M. I. J. An Analysis of 46 Cases of Actinomycosis, with Special Reference to Its Etiology. *Am. J. Surg.*, 1941, 52: 447.

The theory that actinomycosis is contracted by chewing straws and grasses is at variance with the present day biological and bacteriological concept of the mode of infection of this disease. An attempt has been made by the author to correlate clinical findings with the facts established by the laboratory.

It is now a definitely established and accepted fact that the true causal organism of actinomycosis is an anaerobe, never found growing in the outside world. Furthermore, it has been cultured from the mouths of normal individuals with the subsequent production of typical actinomycotic infection in the tissues of laboratory animals.

For these reasons the biologist believes the organism of actinomycosis to be a natural inhabitant of the digestive tract, especially of the mouth, and believes that the infection is introduced into the body from outside sources. There is no biological evidence to support the hypothesis that actinomycosis is introduced into the body by vegetable matter.

Findings in the author's own 46 cases and in those of collected material would tend to show that the habit of eating grass, the proximity to infected animals, and special types of occupation, things which we have heretofore associated with the mode of infection of actinomycosis, are probably present considerably less than 50 per cent of the time.

The fairly even distribution of actinomycosis between the rural and urban population is noted for the first time.

INTERNATIONAL ABSTRACT OF SURGERY

A relatively good prognosis is indicated in the cervicofacial cases as evidenced by the result obtained in treatment of such cases whereas the outlook in thoracic and abdominal cases is extremely grave

JOSEPH K. NAY, M.D.

DUCTLESS GLANDS

Mottl T. Studies on Modifications of the Genitalia in the Female Guinea Pig by the Action of Prostatic Extracts (Rice, the modification of the apparatus genitalis feminae per actionem extracti prostatici) *Gynolog. T.* 1914, 7: 141

Research up to the present time has not succeeded in establishing or ruling out the possible function of the prostate as a gland of internal secretion. Serravallo and Jares demonstrated tubular atrophy and a perimetria after prostatic resection and were successful in preventing these results by the injection of prostatic extracts in glycerine. Condellone and Oppenheim found gynecomastia after prostatic myomectomy employing the same method. Oppenheim found gynecomastia in the liver pleural and lungs while the testes showed signs of hypofunction. Removal of the prostate gland in the human being seems to elicit a tendency toward atrophy of the testicles and a diminution of libido but prostatectomy is ordinarily performed in the presence of pathological conditions which could in themselves account for these gonadal symptoms hence such data are probably of little value. Studies have also been presented on the oral and parenteral administration of prostatic extract

but none has been reported on the effect of such preparation on the female genital tract.

In a study which preceded the present one the author injected prostatic extract into female guinea pigs over a period of twenty days and found no change in the genital organs except a pronounced and intensification of the estral phase which were believed to be related to the vasodilatory effect of the prostatic extract. Vaginal smears from intact and castrated animals were examined and Mottl concluded that there was no hormonal effect.

With the use of extracts prepared as described by the author in his previous article a series of female guinea pigs was treated with extract corresponding to 1 gm. of fresh gland on alternate days for a period of fifty days. Ten animals were reserved as control. A second series was castrated and similarly treated with extract over a period of twenty days. In a third series treatment was delayed until a month after castration. The animals were sacrificed after the completion of the experiment and then gross anatomical examinations were carried out.

The findings served to confirm the conclusion of the foregoing studies that the influence of the prostatic gland on the female guinea pig could not be demonstrated greatly prolonging the estral period of the untreated normal cyclic character and evidences of prolonged estrus were observed in the experimental animals. The results of the effect of castration on the estral cycle were confirmed.

EDWARD K. NAY, M.D.

SUBJECT INDEX

- ABDOMEN**, Chronic pain in, due to hypoglycemia, 47, plethora of, in pathogenesis of acute syndrome of pleuropulmonary disease in, 244, calcification in, interpretation of its roentgenological manifestations, 287, hernia in, or intestinal incarceration, 2 cases pre-operatively diagnosed, 288, traumas of, panel discussion, 299, apoplexy within, 332, present status of peritoneoscopy, 423, surgical significance of pain in wall of, 427, floss silk lattice posterior repair operation for direct inguinal hernia, 427, results of operation for inguinal hernia according to method of Bassini modified by Baggio, 428, selection of cases for peritoneoscopy, 430, peritoneal absorption, absorption of granular substances, 431, peritoneal vaccination, irrigation, and chemotherapy in treatment of experimental peritonitis, 432, prophylactic treatment of postoperative diffuse peritonitis with vaccines, 432, experimental contribution to treatment of peritonitis due to perforation, 433, post-traumatic subcutaneous intestinal prolapse, 435, injuries of, 482, gastroduodenal and hepatobiliary circulatory disorders following lesions of sympathetics of, 527, why inguinal hernia recurs, 532, pathologico-anatomical changes in adjoining organs and tissues in acute appendicitis, 537, abdomino-thoracic injuries, 580
- Abortions**, Anomalies among, origin and clinical significance, 156, fate of fetus after threatened, 448
- Abscess**, Surgical treatment, by drainage, of subacute and chronic putrid, of lung, 32, allergic factors in etiology and symptomatology of acute, of tongue, review with 3 clinical cases, 123, surgery of intracerebellar disease, 127, thyroid perichondritis with descending, of neck and mediastinitis, 210, surgical management of diverticulitis of colon, collective review, 222, abdominal traumas, panel discussion, 299, management of acute perforated appendicitis, 507, pyogenic infections of spinal epidural space, 525, emergency laminectomy for acute epidural, of spinal canal, 526
- Acid base balance**, Anoxia—its surgical significance, 105
- Acidity**, Changes in gastric, caused by cholecystogastrotomy and cholecystoduodenostomy for calculus of bile tract, 324
- Actinomycosis**, Roentgen ray treatment of, 290, analysis of 46 cases of, with reference to etiology, 597
- Adamantinoma**, Hemiresection of mandible on account of large, 411
- Addison's disease**, Successful grafting of adrenal gland in case of, 346
- Adenocarcinoma**, Primary, of jejunum, 328
- Adenoma**, New ideas in regard to pathogenesis of, of prostate, 347
- Adhesions**, Role of experimentally produced intrapleural, in extrapleural pneumonolysis and in prevention of surgical atelectasis in animals, 30
- Adnexa**, Defects of, 444
- Adrenalectomy**, Vitamin B complex and, 394
- Adrenal gland**, Anoxia—its surgical significance, 105, successful grafting of, in case of Addison's disease, 346, effectiveness of priming doses of desoxycorticosterone acetate in protecting dog without, against water intoxication, 400, cystic hemorrhagic struma of, 453, metastases of primary carcinoma of breast, with reference to spleen, ovaries, and, 528, masculinizing tumor of left, with metastases of liver and aortic lymph glands, 559, role of, in shock, value of desoxycorticosterone acetate in prevention of operative shock, 584
- Adrenocortical extract**, Use of, in treatment of traumatic shock of burns, 476
- Africa**, Pathology of primary carcinoma of liver in Bantu races of South, 538
- Agglutination**, Iso-agglutinin titer of pooled serum or plasma, 164
- Air**, Transport of patients and wounded by, 487
- Airplane**, Indications and contraindications for, transportation of sick and wounded, 583
- Air-raids**, General principles of treatment of casualties of, 269, London under air bombardment, medical aspects, 371, surgery of casualties of, 477
- Albuminuria**, Evaluation of treatment of, of pregnancy by water balance method, assuming theory of water intoxication in pregnancy, 342, daily variations of blood urea in, of pregnancy, 554
- Alcohol**, Treatment of pain in carcinoma of cervix, collective review, 543
- American Journal of Surgery**, Fifty years of surgery, review of fiftieth anniversary number of, 192
- Ampulla of Vater**, Resection of duodenum for tumor of, 327, cancer of, 3 cases of transduodenal resection, 441
- Amputation**, Problem of war, 171, immediate and late results of primary, of limbs, 177, experience of Canadian Army and pensions board with, of lower extremity, 470, phantom limb, 499
- Androgens**, Effect of, and estrogens on spontaneous benign mammary tumors in rat, 501
- Anemia**, Experimental studies on production of pernicious, by operation on digestive tract, results of total gastrectomy and resections of stomach, 237, results of 3 types of combined elective resections of stomach and duodenum in dogs, 442, results of combined elective resection of pylorus and Brunner gland section of duodenum and distal two-thirds of small intestine on pups, 541
- Anesthesia**, Anoxia—its surgical significance, 105, symposium on injuries caused by congelation, 166, pelvic delivery under local infiltration, 251, clinical consideration of, in intrathoracic operations, 284, post-operative hypoprotrombinemia and, 284, abdominal traumas, panel discussion, 290, relative effect of analgesia and, in production of asphyxia neonatorum, 344, use of cocaine for local and spinal, 386, continuous spinal, 386, of stellate ganglion in treatment of postoperative pulmonary complications, 490, changes in dynamics of circulation in course of ether narcosis and spinal, 491, with injections of ether and oil according to Tóptschibascheff's method, 492, choice of, in Ludwig's angina, 492, management of acute perforated appendicitis, 507, reactions to local, experimental studies with procaine, 586, cardiac massage for impending death under, 587, problem of anoxia in surgery and, 588
- Aneurysm**, Significance of, of abdominal aorta masquerading as primary urological disease, case reports, 63, of splenic artery, 184, carotid-cavernous, 216, polyostotic fibrous dysplasia with cutaneous pigmentation and congenital arteriovenous, 360, case of arteriovenous of renal artery following lumbar novocaine block of Wischniewsky, 491, bleeding from ear as sign of leaking, of extracranial portion of internal carotid artery, 518, post-traumatic, 572

Angina pectoris Coronary sclerosis 4 2
 Angioma of uterus u u s al c se of m t rth gr 444
 Ankle Arthographic studies n 388
 Ankylosis F c t on i f h p p o t 466
 A mal Amo g b h o s r g nd cl n l g n f
 c c 156 fr t l f n t a n l b e 253 b lateral l
 ect p 4 es 453 po t alu t 454
 1 Acute retrobulbar eu itis as m n st ti of
 utel calz d t ue t e tm t w th vasod lat r s
 its s r g l g nific nce p n ciples f r g l p r ac
 t g s problem f in urgery a d th sia 388
 A th ax 280
 Antiseptics in b n w unds xpe m tal study f h s
 t l gical reaction f c reb l tissues t n solu
 t on 214
 Antise A R lat e l f sulfo amid d exp
 m t l gas g gre e 283
 1 t t n N w o cept f t m u of d p h t why
 modern fals— dty f t tito ct go
 st b lty f t t a der suboptum l t g c d
 t ns 379
 A trum Neoplasms l g asoph ry d h a d
 palate 11
 A Squam s c il c m f d c a l of 55 c
 4 res its w th f pl t c oper t f n
 t uence f 438
 A ta S g n f i c a n c e of a n e r y s m f a b d m u l m a s q r d
 g as primary u l gical dise se as repo ts 63
 oe tgen man f st t f t r i l o s f b r a n h s
 of b d m n l w th f n c t c c l e f i c t n f
 branch f l u a x s 383
 Ap l y s i s Thor opl ty w th extra f s c i a l 29
 Apopl y x I t a b d o m n l 332
 Appendix m s Revi w f o o c o s e c u t i e 238
 Append t 3 8 t a t m t f a t Frank f d H s p t l
 th rty ix ye r v y f 4 6 5 c 4 5 c l l d
 histop th l g l t r b t t t d y f c h 45
 half century f 45 m g m t f t p
 f t d 5 7 a c t n m d d l e d t l l f e 4 s e
 n d n d l s e r t h i t y e a r s f g 537
 path logic o a n a t o m i l c h a g e s a d j g o g
 a r d t s u e s n a c u t 537
 Appendix T p o g r a p h y a n d e l o p m t f m 37
 x y u i a f l c a l a t d y f 3 s e 3 3
 Appetite Incr a s e d f t d e c r e a s e d c b h y d t f
 p c r e a t e r m e d t 2
 Arm G l a z s f r a t 75
 Army Org n i z t d m p o r t a c e of m a l l u y
 1 80
 Arrh blastoma f ry 550
 Arteriect my n d a g n t b l t r a 473
 A t e r n e Th m b o g i t u s b l t n s (B g r s d e e)
 of p e r m a t e e p o t f c a s e 59 n u t f w l l f
 n m l d p a t h l g l t d y f u s t i s p h y l o g y
 r e l t s g n l r e t m e t a n d t p h g i s f
 d e s e s f 3 6 7 a c t o c l s n o f e p h r a l c l n l
 n a l y s d t t m t 472
 1 t r i g r a p h y R e c t p g t s e g r a p h y d p h t
 r a d g r a p h y 9 s e f e m b o l i s m f l l a r y r t r y
 i m p o r t a n c e f t r o g d 4 2
 Art r i o s c l o s R o e t g m a n f t a t f o f b h
 of a b d m u a l a o r t w th r e f t c l f i t f
 b r a h o f l i a c a x 388
 Art ry n o n t m e a l t d y f b r a i n a f t l g a t i o f
 c a r o t d n c a s e f t r m a t p l a s t g p h i t h a l m
 127 u r y m f p l s 84 l a t e s t i n s e f
 s u t r e f h a r t w t h l g a t o n o f d e s c d g b r a h f
 l e f t o r o r y 22 o e t g o s c p y a s d i a g n o s t d n
 n a r y o c c l u 64 c a s e s 86 p e r m t g o o d
 f f e c t o f l g a t i o f s p l n i c a s c t c p l h p a t i c

synd me 322 scl is of c r o r y d a n g p e c
 t r s 422 b l d i n g f o m e a a s g n f l e a k i n g a n e u
 r y s m o f t a c r a n a l p o t f i n t m a l c r o t i d 518
 Arth it is Gold therapy in hr nuc w th c o n s e r a t a f
 c m p l i c a t o n s 564 S f o m e s o f j u n t s
 Arthrodis Tub rcul of elbow o p e t e r e t m e t
 d t e c h q f o n o m u l s e c t i w th r h r o d
 s i s 63 n t b e r c u l o s x t 467
 Arth g r p h y V a l e f f h u l d e r j t 88 s t d o
 k l j n t 388
 Asc Infestat w th r o u d w r m i n c t th
 u r g e r y 95
 Asc tes P r m a t g o d e f f c t f l t n f p l r t r y
 i n s p l h p a t c s y n d m e f 33 b e g n t u m o r s f
 y s o c i a t e d w th d p l e u a l f f 334
 Asc b c i d D f i c v f g s t c d i n c d c e
 d i a g n o s a d t m t 533
 Asphyxia Possib l i t e v a l u e a d i l m t f m e d c a l
 t e a t m t o f i n t r a u t e i n e 5 x p e r i m t a l s t d y
 r e s p r a t f D r i n k e M r t h y t y p e f r e n m a t o f
 l f t w th 154 s c t t f e w b m 252
 Asphyx n o s t r u m R e l t f f e t o f a l g s i a a d
 s t h a n p d t f 344 p e t n f 45
 Ast y t m a s c b r a l d i t h e r d t 7
 At l t a s i s R d l g l t d y f p l m a r y 9 r l f
 e p e u m t a l l y p o d u e d u n t a p l l a d h e s n
 e t p l l p e m l y s s a d p e t o n l
 s g n l t l t a s a a m a l s 3
 At l s E x p e i m t l t d y o f r o t r y l a t i f 161
 A t r C l o b u l a y f a c t 30
 A e t T m t o f e t t h 77
 A z t m E x p e r i m e n t a l s t d l m t a r y r l f
 b l d b s o r p t i n f r o m g t t t l t r a c t 395

BACK Sc t p a i n n l w d g e m e n t f t i c
 d g n i f c c e u d t a t m t s y m p o s m 35
 Bact C a n t f i n u t e c a v i t y d n c f u m t
 53 l y m p h t c p t h a y f a b r p t o f o m s o
 p h a y n x b r p t o f d y e a b s o r p t f p r o t e i n
 b s o r p t o f r u s e d 313 u r e f m n t q
 f m t h o d d f r d e m t r t g b t a l a s e
 d p t a t f l d a d m s t t t
 r e l y t a c t f b t a f s g n f c g t o r y
 f t 46
 B e t n l g y P i p l e s f g n l p t r g i c l 43
 B b t t d l 4
 B s e d w d s e T m t o f p o t p t i e r e a t
 l p t t w th
 B s s i p e a t i n T h c l p o t a i 42
 B l F c n t s f t h p t c b l d u c t d s e c t o r y
 f u c t f l c l c l s t u d y o l t b e t w e
 d u o d u a l m e n t a s a d a c t f m t d o
 d u e u m d u g f t i n g x p e m t l t d y f r l
 t b e t w e n m e m t i d d m a d f u n c t o r
 f b l r y t r d u g f t g 39 l u n n a t o f
 h l d q t t y d c r s e f m n l s e c t i o
 a n d c u l u m 438
 B l d t f t f t h p t c d c r e t r y f
 t f l e l c l s t d y l t b e t w e
 d u o d l m m t a d t f b l i t
 d u o d u m d r i n g f t g x p e m t l t d y f r e l a
 t b t e n m e m t f d o d m d f t i o
 f b l r y t a c t d r i n g f t i n g 39 d t c l m l k
 f m t h l d o c h d e m t t d b y c h l a g
 g r a p h y 331
 B l y t r a c t f s e t s t t f g r y f 45 u t l y i s f
 l e 146 c h g f s t r a c i d t y u s e d b y
 h l c y t g a s t o s t m y a d h e c y s t o d o t m y
 f a l c u l s f 34 l o n t f 39 o e t
 g l o c l l u a g n f p o t a f i s t b e t w

- and preserv d fascia as s tur mat l 362 s
 c lled insufficiency f tures 362 e rly p f
 experim ntal study of certan f tors 363 l f a
 t on a d os fic t on c trol of calcific t n in frac
 ture c llus in rach tict r 363 ea ly perat ve eat
 ment of cute h mat g nous st my litis 384 de
 layed operat v te tment of acute hemat g ous
 teomy litis 385 roe tg n pects f g t-cell
 t m rs f treated with r e tg n irradiat on 387
 d tribut on f l n of m scl j t d thr gh
 work with c mp sed air ma hin s thei l liza
 ti 46 f eque cy f comp c tions of urin ry ys
 t m n p tents with to r ticular tub losas 463
 experiment l sea h on ost g is by v s c l
 muc sa n p r of 464 s gm t l regene ation f
 w th t plast cgrafts 464 t que on int r r l t
 h p of tum rs f 465 ost omyelitis f f tal 3
 cases 57 statit l d roentgen alv f oo
 case f t b loss of a d j int 564 suif nil mde
 in t o r ticular surg y 567 entg olog c l c n
 s d rations in d gn nd t tment of primary
 mal gnant tum rs f 589 pseudofractures in d se
 affecting k l l t sy tem 590 r d i se t ty f
 marrow f 593
- Boothby mask. Anoxia—its g l s gnifi e pri
 ciples of surgical pract 5
- B in M rph l g l findings in of w lling f 7
 bral ast yt mas d th r den t es 77 s r
 g ry of hypophysis 8 endocr e stud e in rabbits
 following sect on of hypophysis l stalk 79 ua—
 its su gical s gnifica c p inc pls of su gic l prac
 tic 5 f n t i f p an l g l d s 6 clin l
 t t t cal sp t n s p t t w th cranio c b l
 w u d—Sp m h W r f m 936 t 939 6
 anatomical study of a llt lug t n f t d t ry
 i case of tr umat c pulsat g phth lm 7
 diagnos s of cerebellar dise se 7 urg ry f intr
 b lla dis se 7 f or ble types f tum r of
 d r ults f th p at ve remo l 27 bdur l
 h mat ma 8 en phalop thy asso ted w th sul
 f m thylth l th rapy 90 phy ology f cere
 bellum 4 ntsept w ds of experim t l
 st dy of hst l g l react n f ce ebral ts est
 arous at ptc sol t 4 some nt 0
 p thology of cereb llar y tm 5 t be l m of
 c brum report of c 6 r lts of su g l t e t
 m t f tumors of 2 6 som n ologic l p t
 d t m t s t s of pulm y cancer 7 int
 rami l se of s lfo mid expe umental t dy f
 hst l g y a d rate of absorpt 8 red t n f
 pain d oth r ndesur bl t ns d t p umo
 e phal graphy 375 c l u f t f cho d p l xu
 a d t d plac ment by exp nd g intracra al le
 sions 3 5 p ull ma of h d p l xu 3 6 t u
 rologi f diagn is n 3 r f d cases f t m of
 3 6 perie ces w th intramedull ry t t t my r
 hief of fac al p n a d m m ary f operat e re ults
 3 8 p l i 396 h uld f h b l l t w d of b
 sutured 477 t re tment f fcted sh tgun wound f
 skull d in military h p tal 480 tr umat c epi p y
 after gu shot w ds f h ad s spo t s
 sub rachno d h m r rhage 5 po ta ous bral
 h m r rh g 5 ist r f h m of p ramedian
 lin 53 da g r s f r diat n without b psy of
 tum rs of an hild en 53
- Breast N ppl d hary clin p thologic l t dy 3
 cases of t berculo f 3 r knowl dg of fib mas
 d fib my ma f ppl 3 p d d p j d ce in
 treatm t of ca 99 in eas d re ta ce to
 syphilis in rabb t f low g prol g d administrat
- of urin ry estrogens f minuzing ffects fest oge on
 adult male rabb ts h ract f ract ntot p m
 p l luidum i f minized m l r b b ts 2 ma gene t
 f can c f with p p r tve and postopert e
 irradiat 291 r l f estro nic s b tanc in
 prod t n of mal gn nt mamma y l sons 3 r t t
 m t f carcin ma f by i t r t t al irradi at on 495
 f fct of a dr g a d t ge s po tan us
 benign tum rs of rat 5 metast of prim ry
 ca ci ma f with fee e t ple ad t
 gla d dovaries 53
- B east H ling i c n radially per t d po
 b tw en 19 7 d 939 in G etting U r sty
 Su gical Clinic with refere c t p op r t i d
 postopert r rad ton 58
- Buerge diseases Th omb o ang i t bliter s of sperm t
 a t pot of case 59
- B rns G ral principl f t tm t f f r ad cas al
 t 69 s gcal pect f light ing st ok 278
 t tment of perf ilial injun d of h d 79
 treatment of oo w w d d 377 ab opt ion of
 sulfanilamid from s r f ce injured by 385 use of
 d enoc r l tract in treatment f f a matic
 sh ck f 476
- B r s t Clin l d xpe umental co t r butio to study
 f t p thoge et c problem 497
- CALCIFICATION** And O sificat o n c l l u h al
 g f actures n or m l rats 73 of up nat s
 t do ew tre tm nt 260 ntra abdomin l int
 p t to of t roe tge olo l manifest s 87
 f choro d ple d ts displa ement by exp d g
 intr c r ialle s 35 d osific ton t l f
 in fact u e callu n ach t c r t s 363
- C lcanos P r thyo d tumo with g eral 4
 C l c um Val of n l b no nd in te in tia 448
 depo ts of n h o l d ub m l b r s t
 vey of 2 2 h uld rs 465
- Calcul s Some p bl m m g m t f urinary 63
 studi on t l g y f g l l t s 4 at uret pelvic
 j n t 55 h g g stric acidity ca d by
 holecyst gal t m y d h cecystod ant tomy
 f f b l t ct 3 4 tgenological diagn o f
 po t fust la b tw en gall bl d d o d o
 d um d by biliary 33 g l l te l tho
 t my 346 p ineal p st totomy d p state t my
 f m l of prost c 347 mm d t post perat
 t tm t a d f ight g in tre rr ce p rat s
 f n ry 456 in c n d d g n s s of pa cr t c
 l th s s 18 539
- C mel bite les o 585
- Ca cer Of l ynx v w f 70 con cut ca 5 f
 lung 35 pract l ev l t io of g st osc py g s
 trosc py in dy p p a m l types g t o j n al
 ul d 4 l of f l p n t bes sp d f
 pelvi 55 d m tr tm t f of t ru 93
 vironm t i lato to di posto t a d g of 97
 prid and p e yud e t tme t f 99 infuie ce f
 g et c constit p d t n f ist ce to
 f n s pla tabl m s t m rs oo ol m t of
 media t l lymph chann l n s co dary f l g s
 9 l f d p c t r i z t n in pre t o of of
 r vix 49 nat o lity and f cervix 49 s gnifi
 c f horm g t 86 f l p a d to g y
 with cons d to of s t t d t Uni r sty
 Surg l Ch c n C ty f Fre burg from 9 8 to 938
 2 8 l r ying f i sur f f l r y n ob r v t b d
 n s secut es som c rologi al p
 t d t met ta f p lmo ry 7 q am s
 c l l of d anal nal 55 case 40 77 c es of

- primary, of vulva, 246, radiation therapy in, of skin, 290, management of, of breast with pre-operative and postoperative irradiation, 291, transthoracic roentgen treatment of, of esophagus, 292, treatment of, of ovary, improvement of results with postoperative radiotherapy, 292, five-year end-results in cervical, treated with radium and 800 kilovolt roentgen rays, 293, of tonsil, 310, differentiation of bronchiogenic, 321, surgical aspects of, of esophagus, review of literature and report of 4 cases, 323, use of clinical material for investigation of gastric, 325, trend and geographic variation in mortality of, and prevalence, with reference to gastric, 326, of head of pancreas, 40 cases, 332, 6 additional cases of primary, of tubes, 335, results of radiotherapy of hypopharyngeal, at Radiumhemmet, Stockholm, from 1930 to 1939, 390, roentgen irradiation of pelvis in, of cervix uteri, 390, Radiumhemmet experience with radiotherapy in, of corpus of uterus, 392, sunlight and, of skin, 397, some notes on treatment of, of bronchus, 421, non-specific inflammatory tumors of large intestine and their differential diagnosis from, 436, of large intestine, 476 autopsy records, 437, of ampulla of Vater, 3 cases of transduodenal resection, 441, comments on treatment and sequelae of, of uterus, 444, secondary lesions of urinary bladder in, of genital tract in women, 446, treatment of, of breast by interstitial irradiation, 495, mule spinner's, 503, estimation of operative risk in patients with, 504, pain in, of face, jaws, and neck, 524, metastasis of primary, of breast, with reference to spleen, adrenal glands, and ovaries, 528, healing in breasts with, radically operated upon between 1927 and 1939 in Goettingen University Surgical Clinic, with reference to pre operative and postoperative irradiation, 528, surgical treatment of, of esophagus, 529, factual considerations in early diagnosis of gastric, 533, pathology of primary, of liver in Bantu races of South Africa, 538, treatment of pain in, of cervix, collective review, 543, diagnostic value of vaginal smears in, of uterus, 549, of cervix uteri in childhood and adolescence, 549, value of roentgen therapy by method of Coutard in treatment of, of uterus, 591, preliminary observations on quantitative examination of human biopsy material taken from irradiated, 592, attempt to determine the general conditions of predisposition to, 596
- Carbohydrate, Increased appetite for fat and decreased appetite for, of pancreatectomized rats, 102
- Carbon dioxide, Bronchspirometrical study on ability of human lungs to substitute for one another, one completely cut off from respiration, both lungs breathing, one nitrogen and the other oxygen, with or without administration to one lung of, 24, anoxia—its surgical significance, principles of surgical practice, 105
- Cataract, Surgical removal of crystalline lens without inectomy, 8
- Causalgia, Minor, following injuries and wounds, 491
- Cecum, Triple occlusion of intestine from volvulus of, and reciprocal constriction of small intestine and colon, 144
- Cecum-appendix, Topography and development of, 237
- Cell, Induction of multipolar division of, with x-rays and its possible significance, 592
- Cellulitis, Roentgen irradiation of, of face and neck, 591
- Cerebellum, Physiology of, 214, some notes on pathology of system of, 215
- Cerebrum, Tuberculoma of, report of case, 216
- Chancres, Survey of 68 cases of extragenital, 96
- Chemodiagnosis of malignancy, 502
- Chemotherapy, In treatment of complications of acute middle ear suppuration (petrositis and meningitis), 208, of bacterial infections, 281, in experimental gas gangrene, distribution of drugs from infected wounds, 282, and wound infection, 378, for infectious diseases and other infections, circular letter No 81, 379, peritoneal vaccination, irrigation, and, in treatment of experimental peritonitis, 432
- Children, Study of malignant tumors of, 187, vertical traction or traction at zenith in fractures of femur in, 365, sulfamylguanidine in treatment of acute bacillary dysentery in, 399, fractures in neck of femur in, with reference to aseptic necrosis, 469, management of acute perforated appendicitis, 507, dangers of radiation without biopsy of brain tumors of, 523, carcinoma of cervix uteri in, and in adolescence, 549, malignant tumors of kidney in, 560
- Chloremia and length of survival after experimental occlusion of intestine, 435
- Cholangiography, 182, diverticulum-like formation in choledochus, demonstrated by, 331
- Cholecystectomy, Macroscopically non-pathological gall bladder, clinicopathological study, 330
- Cholecystitis, Acute, 241
- Cholecystography, Oral, basis of standardization of method, 182
- Cholecystostomy, Present status of surgery of biliary tract, 45
- Cholesterol, Serum and irradiation sickness, 292
- Cholic acids, Elimination of, quantity and course of normal secretion and circulation in man, 438
- Chordoma of basiocciput and basisphenoid, 4 cases, 206
- Chordotomy, 526, treatment of pain in carcinoma of cervix, collective review, 543
- Choroid plexus, Calcification of, and its displacement by expanding intracranial lesions, 315, papilloma of, 316
- Circulation, Therapeutic considerations in acute obstruction of small intestine, principles of surgical practice, 1, peripheral, including lymphatics, surgery and basic sciences, 195, influence of thyroid hormone on heart and, 211, collapse of, and wound shock, 274, changes in dynamics of, in course of ether narcosis and spinal anesthesia, 491, gastroduodenal and hepatobiliary disorders of, following lesions of abdominal sympathetics, 527
- Clavicle, Clinicostatistical study on fracture of, 468, gunshot fracture of, 486
- Cold, Comparison of effects of heat and those of, in prevention and treatment of shock, 489
- Colitis, Bilirubinemia and its significance in gastro-intestinal ulcer and in, 235, mortality factors in surgical treatment of ulcerative, 435, appraisal of medical versus surgical treatment of idiopathic ulcerative, follow-up data on 50 cases, 536
- Collapse, Delayed, after head injury, case records, 214
- Collective review, Survey of estrogenic dosage, 49, bearing of gastric secretory mechanism upon surgical management of gastric and duodenal ulcer, 133, surgical management of diverticulitis of colon, 222, "pressure theory" of eclampsia, with selected briefs, 336, present status of peritoneoscopy, 423, treatment of pain in carcinoma of cervix, 543
- Colloid, Morphological findings in cases of swelling of brain, 17
- Colon, Resection of, by intussusception, one stage interiorization procedure resulting in end-to-end anastomosis, 43, intussusception of, 43, triple occlusion of intestine from volvulus of cecum and reciprocal constriction of small intestine and, 144, surgical management of diverticulitis of, collective review, 222, retroposition of transverse, complicated by ileocecal volvulus, report of 1 case with recovery, and review of literature, 239, symptomatology and his-

Gold therapy in chronic arthritis with special consideration of complications, 564
 Gonococcus, Observations on vulvovaginitis from, 335
 Gonorrhea, Treatment of, with sulfapyridine preparations (M.B. 603), 157, sulfacetimide, toxicity and efficacy in, and urinary-tract infections, 562, refractory infections, elumination by combined artificial fever and chemotherapy as related to military medicine, 577
 Grafts, Segmental bone regeneration with heteroplastic, 464
 Granuloma inguinale, Initial lesion of, 562
 Gummata, Esophageal obstruction due to, of esophagus and diaphragm, 221

HALLUX valgus, 161

Hand, Partial myotomy in treatment of divided flexor tendons of, 72, anatomical diagnosis of injuries of, 176, purposeful splinting following injuries to, 279, treatment of superficial injuries and burns of, 279
 Head, Gunshot wounds of, in 1940, 81, delayed collapse after injury of, case records, 214, apparently trivial injuries of, preliminary treatment and examination, results and pathology, practical points in treatment, 371, pneumitocoele occipitalis, 419
 Healing, Vitamins and reticulohistocyte system in, of wounds, 497
 Heart, Pathology of disease of, in pregnancy, 60, anoxia, its surgical significance, principles of surgical practice, 105, influence of thyroid hormone on, and circulation, 211, late results in suture of, with ligation of descending branch of left coronary artery, 220, symptomatology and histopathology of, in patients with megacolon and megacolon, 297, total thyroidectomy in cardiac patients, 312, gunshot wounds of, 482, surgical revascularization of, 520, massage of, for impending death under anesthesia, 587
 Heat, Action of dry, on Wood's sarcoma, 100, comparison of effects of, and those of cold in prevention and treatment of shock, 489
 Hematoma, Subdural, 128, subfascial, as complication of crushing injuries to foot, 280
 Hematosalpinx, Obliterating, 245
 Hemoglobin, Anoxia, its surgical significance, principles of surgical practice, 105
 Hemorrhage, Small, in gastro intestinal tract, with reference to relation to pseudomelanosis, 40, clinicopathological investigation of causes of menorrhorrhea, 56, blood and plasma transfusion in alimentary, 79, hypophyseal syndromes of traumatic origin, 100, traumatic secondary, of spleen, 146, fatal bleeding from gastric duodenal ulcers, 236, intra abdominal, from spontaneous rupture of subserous blood vessel of uterus during pregnancy, 249, problem of blast injuries, 269, abdominal traumas, panel discussion, 290, peripheral vascular injuries, 376, isinglass as transfusion fluid in, 383, plasma volume and plasma protein concentration after severe, 395, pathogenesis of hyperazotemia in gastroduodenal, 433, bleeding tendency in diseases of liver and biliary passages, 439, Vitamin K administered to mother during labor as prophylaxis against, in newborn infant, 450, spontaneous subarachnoid, 522, spontaneous cerebral, 522, quantitative aspects of transfusion, transfusion for, and wound shock, dangers of transfusion, control of dosage, 572
 Hemothorax, Treatment of traumatic, 25
 Heparin, Treatment of staphylococcal cavernous sinus thrombophlebitis with, and chemotherapy, 8, pure, for prevention and treatment of thrombosis, 366, treatment of thrombosis in central vein of retina with,

411, use of, in prevention of thrombosis after gynecological operations, 447
 Heredity, Induction by roentgen rays of changes in, in mice, 184
 Hernia, Two hundred unselected operations for inguinal, without recurrence, 39, technical points in Bassini's operation, 142, closure of large apertures of, by skin-flap plastic operation, 234, intra-abdominal, or intestinal incarceration, 2 verified cases pre-operatively diagnosed, 288, umbilical, 324, study of mesocolic, intramesocolic variety, 427, floss silk lattice posterior repair operation for direct inguinal, 427, results of operation for inguinal, according to method of Bassini modified by Baggio, 428, study of vasolacunar femoral, 429, cisternal, of paramedian line, 523, why inguinal, recurs 532
 Hip, Concerning delayed sequelae following traumatic luxation of, 364, function in ankylosis of, 466, arthrodesis in tuberculous coxitis, 467, congenital dislocation of, late results of closed reduction and arthrographic studies of recent cases, 568
 Histamine, Significance of isolation of, from urine in toxemia of pregnancy, 555
 Histidine, Metabolism of, in normal and toxemic pregnancy, excretion of, in normal pregnancy urine and in urine of patients with toxemia of pregnancy, 554
 History, Fifty years of surgery, review of fiftieth anniversary number, American Journal of Surgery, 192, Semmelweis, in notes of his contemporaries, 193, story of plastic surgery, 505, of crystalline lens 517
 Hormones, Endocrine studies in rabbits following section of hypophyseal stalk, 10, hyperfunction of thymus as disease, preliminary clinical reports, 37, survey of estrogenic dosage collective review, 49 comparative investigations of action of female and male sex, and suprarenal cortex, on uterus, 55, 50 cases of incomplete descent of testicle treated by, 66, effect of thyroxin and thyrotropic, on basal metabolism and thyroid tissue respiration of rats at various ages, 101, qualitative and quantitative study of urinary estrogens in man, 102, increased resistance to syphilis in rabbit following prolonged administration of urinary estrogens, feminizing effects of estrogens on adult male rabbits, character of reaction to treponema pallidum in feminized male rabbits, 102, significance of, in origin of cancer, 186, organic changes in rats treated with massive doses of synthetic estrogenic substance, toxic effects of synthetic estrogenic substances, 190, effect of long-term stimulation of male and female rats with estrone, estradiol benzoate, and testosterone propionate administered in pellet form, 191, relation of sex, to tumors of female reproductive system, 191, influence of thyroid, on heart and circulation, 211, role of estrogenic substances in production of malignant mammary lesions, 321, effect of follicular, upon function of human myometrium, 334, male sex, 350, effects of preparations from anterior pituitary lobe in experimental pancreatic diabetes, 400, mechanism of antigonadotropic epiphyseal factor, 401, endocrine factors influencing tumor development, 401, effect of androgens and estrogens on spontaneous benign mammary tumors in rat, 501, three years of gynecological endocrinology with new observations, 552 prevention of experimental fibroids by cortical, experiments with desoxycorticosterone, 553, role of vasopressor and anti-diuretic, of posterior lobe of hypophysis in pathogenesis of late toxemias of pregnancy, 555
 Hospital, War experiences from surgical division of base, 169, surgical bacteriology, panel discussion, 403, isolation, for gunshot fractures, 488

Hydatid m mole Tans b d m l punctur f ut rus
f diagn is f 61
Hydra thro is Re urri g f k d e t virus of disease
f N c las and Fa r 7
Hydrog n p e xide Local use of sulf lamude p w d d
in wou d fect 89
Hyperalg ia in soft p rt d pel s symptom from
pl x hypogastricus 55
Hypereme is gravidarum Ocul mplicat 342
Hype glycemia Influa f impl t tion f p t r y
gl d a u nary eluni t n of b ta ce p od g
101
Hyperparathyroid m Cas w th severe k dney cha g
t d b y p thyridect my 4
Hyperte n Eff e t i p gnan y n perim t l 62
rg l m geme t f 8 n fic f in
p taf m w th ch u n r y r t t io 257
Hyperthyroidism E phth lm in 307 m agem t f
compl t d b y th c nd t n 31 h g s n l
soc t d w th w th t dy of pl sm p thrombin
l v s amm date pot p t p nod 33
Hypert p Oc l 308
Hypoglyc m Ch c b d minal p n d e to 47
Hypopharynx Re ult f rad th rapy f can f at
R d m h m m t St kh lm f m 93 to 939 390
Hypoprothomb msa P t perat a d sthe ia 84

LEITIS Atyp c l m l ntg l g c l l m tat
1389
Ileu Abdomi trauma p ld 40 o ntg
di gn is f gl t 589
Il m d ase f acro-hac j nts w th con d rat n f
flammat ry d sease and th o g 7
Imm n t n A t agant t ga g g and t t
3
Imm t n f s a t s p t msa 83
Icus Ma gem t fa t perf rated app nd t 57
l c t n Ce Urn ry r l u ed by to at n d
m inten f m m l po t f u th 56
I fect ubpect al pbl gm 88 83 t m t f
pt m re lt b fo d ce d t of lf
md ompo d 88 m thod f the py f g
gre s d in g l dep rtm t f Tw lfth
Clinical H p tal 89 t m t f t phyl al
pt msa w th sulfam thylth l a d lf th l
port of 12 s 89 l ius f lf l mid pow
d a d hydros pe xid w d 89 i f t t
w th ro nd w rm c nnect w th g y 95
survey f 68 es f trag t l h re 96 la
lymphogr ul ma e m tran e t b
ter m f ll g t illect my xpe m t l bac
r n logical a d clin l t dies 3 t e m t of
tube c l s l lymph ma l te es lt 3
cas s t eat d p tly g lly patly d l g c lly
23 experim tal t dy f al i t perito
s era 4 t e tment f g rh w th s lf pyr din
p p ratio (M B 603) 57 st my l t f m
an rob p th g mic o-organism 59 t d
et l gy of gall t s 4 thra 80 clin l
t t s t r tme t i o o c ecut case w th
m t lity rat f g pe c t 80 bc taneo
phlegm nd t d p lth r a b ill 2 h m th rapy
f bact nal s a h m t r l f f c t f s lf mid
preparat s 8 h m th rapy experim tal gas
gang n distrib t f drugs fr m infect dw d
8 ses a d bu f lf namud drugs 95 b-
d m nalt mas p ldiscu 290 ch m th rapy
and wo d 378 hem th rapy f infect d sease
a d oth r cul l t t No 8 379 taphyloc
sept emu 399 s lf nulygu nudi f im t f

acute b ill ry dysentery n children 399 bsopt
e c etion d d t b t u of s liazum (l lania
med pyrim din) 399 p n cipl s f s g l p c t c
gac l bacteriol g 43 s p t spondylit repe t f
7 as 466 tet t d f p phylax 46
Koch s b ll shown int e f lymph g l m to
s s benon (Schauma) by m n f H lberg s
stai ng m thod 498 pyog c n f p n l p d al
p c 525 t l l i of granu l m gunn le 562
b r p t n o f b te to s a d k m f m
t s import f lymphat c culat bsopt
tion f h mical b t e s ake en m s b r l
to lymph flow in flammat n 574 fact ry
g nococ lminat n by mb ed artifi lf
dchem th rapy r lat d t m lary m di m 577
p d de t f i to of g g r e a e b 577
p phylax f t t s 585 f t f oentg th rapy
up p od d k n f rabbit w th cult re f
str pto cocc s hem lytic s d t phyl coc u eus
59 foot d m th d s a m m n l ight f most
cent ea ch 595 llys of 46 ses of t my
c sis w th f enc t t logy 597
Inflammati Abs rpt f bact t m d s k
oms fr m t s mpo t f lymph t circula
tio abs rpt f ch m l s b t s k noms
b t al toxm lymph fl w 574 r ntg the py
f p o sse f 590
I testn Th p t cons d t acut b trut n
of m all p n ples of gac l p act e bstru t
of r lt of tme t w th u f i te tun lnt b
t 43 t pl ccl f fr m l u l of c m
and p o l str t f m all a d colo 144
rg lma g m t f d t lts f l l
t i e ew ret p to f tr rs col
c m pl t d by leo l l l report of c
with r ery d re w f l t u 239 ab
m lit f m all trat l d t b some
bs v tion th physiol g cal b 287 t
abd m al h m a cert f l ve fied a
p e p e t ly d gn ed 288 unpl leers f m l l
37 pot t m t b c t u p lap f 435
chl ma d length f v l l t xpe m t f
ccl d f 435 pe fi d m m t r y t m s f
l g d th r diff ntial d gn f m c r m m
436 carcin ma f lag 46 a t psy ec d 437
tg l g cal d gm f t m r s f m all 494
st dy of m t lity f h m n l expl t f
dy 30 g f l f stabl c l 556
pp al f m d al s g l t t m t f
diopath le tie l t f l l w p d t 5
c s 530
I t t F l t n f t tme t of album ia f
p gn y by w t bala m th d m th r y
f w t p gn cy 34 eff t v e of p m g
d f d soxyc r t co t n cetate prot t b
d lect m d d g ga t w t 400
I t s pt Of l n 43 t f l b y
st g int r n z t n p oced r l t g ed to d
t m 43
Iodochl r l U of rad paq d g tic m d r t
g d gn s f rals m c l c d t t
I g l s s a t a n f n f l d h m hag 383
JAUNDICE Ch l g graphy 8 d f e tual diag os
f by c m b n d serum ph ph t l t m n t d
c phal floccul t t 438
J w l t err lat of d t try d r g ry tre m t f
d f r m t f f c d pra t l xpe a d
crit al s d t i o s t tme t of g h t w u d
of 8 t m t f b e g t m r s of o6 g l d

te de cy in di ase of and biliary passages 439
 primary tum f 439 path logy of p m ry c r
 noma f in Bant ra s of S uth Africa 538
 masculinizing tum of left s p nal gland with
 m tastases to a d aortic lymph glands 559
 L bectomy in c of injury t hilum of lung se
 Ludwig's gun Choc f sthes a 40
 Lu gs B onchospi metric l study on bility of human
 to substi t f r eanother c mply te cut off om
 respiration b th lungs b thing one nitr g d
 th xyge w tho with t administrati nt l g
 f c bondi xil 4 r dological treat dy f p m lary
 atelectas s 9 r gical treatm nt by dr g of
 s bac te d chron c p trid abs f 32 singl con
 g t l yst of 33 p lypo d bro chial tum s 34
 rcinoma of 35 blit r tuon of pleu al sp c f ll w
 ing p m n t my 37 case of pulm ry n s
 (bl t) du to h gh explosive 8 di cu ion ch st
 un j n 82 roentg sc p c pect f pot p t r tve
 complications i elt n to the r genes 86
 an ma—i t gical gnif n e p n ciples of s gic l
 practi s th plasty with ext al scial ap c ly
 is 29 l me to f m diastal lymph hannels in
 secondary carcinoma f 9 clini l d tatist cal
 epot n 93 w und f pl ur d 3 gun hot
 w und f 73 m n ologi l p t due t
 met t is f c e of 27 l bectomy in c se of
 injury t hilum f 22 phys ological adjustm nt
 s bleth reduction of capacity of in dogs 2 three
 cases of emb lism of p tim t ble 75 fat
 mbolism f path lgy p th g the pe s
 lin l mat rial h t n 77 bd num l
 tr uma p l d cu n 99 diff nt n f
 bro chu g nic c in ma 3 p umary t m rs f
 entgen diagn s d th rapy s cu n f
 (ba t) 375 tuberculo s c t t d t
 pleur l d c mpress n 420 pos bilities d p gn
 f t d age f ca t s acco ding to M l d
 4 pp t p lmo ry processes 4 t r tm t
 of in m of b n h 4 ane the of t llat
 ga gl int atm t f pot pe t e c mply t o
 f 490 r ntg lg l v st g ton of tr umatic
 changes in f ombl t l t thora 494 p ctu s
 f l e trath c f rms f t b loss 504 ch e
 f p oced re in tr tm t f t be c l sca tes 539
 Lymph gr loma Doe c t viral nt xst? 88
 Lymph gra l matosis Koch b li shown in c f
 benign (Schauma n) Hallbe g tain g method 498
 Lymph g l ma v ne um Ocul
 Lymphoma T me t of tube l rvical l t lt
 in 23 cas t at d p tly urg lly p tly d
 logically 3
 Lymphos ma 3 app r ntly d c ses 398
 Lymph ve sel In olveme t f m dia t al lymph ch
 nels in sec dary ca in ma fl g 9 p riple al
 c reulat including s gry d ba scae es 95
 p thw yf abso rpt f m pba yn bso rpt
 f dy s b rption of p t uns absorption f viruse
 and bact na 3 cl llymphat m ta t f
 carcin ma of col 437 perat t atm t f
 lephant sis 498 mas uluz ng tum flit p
 al gland w th m tast ses to h da t 559
 bso rpt of b t r t in d s k m
 from t s s e impo tance f cir ult f bso rpt
 of ch micals bsta ces s k v ms b t nalt n s
 lymph flow in nflammati 574

MALIGNANCY Of ral c vity 44 h m diagnos
 of 5 suit fa gical a d mb ed t eatme t
 f pat t w th t m rs 54

Mandible Hemiresection of on accou to f l rge adama t
 n ma 411
 M h fractur 3 ca es 486
 M sks Surgi al 493
 Masto dect my Practical points t tra ho chl ad c l
 Mast dit Oper ti t tment of r p r t on w k d
 t Royal N th Shore H spital of Syda y from
 January 93 t Septemb 940 309 Mon mde m
 therapy f te t t m dia d 59
 Media t nit Thyrod pe h drit s with d scend g
 bsc f ka d 2
 M d tin m Surg cl t tm t f tumors f 3
 Med lla Exper nc s w th intramed lary tractotomy
 relief of f cal p m d ummary f p rat ve results
 318
 Megac lon Sympt matology a d hust path lgy of hea t
 i pat t w th m ga-esophagus d 97
 M ga ph gu Symptomat lgy d lu top th lgy of
 h r t pat ts w th nd m g l 297
 M l m M lgn t t dis in Am r n N gro 187
 malig t r7 cases 88 mal gna t f u e l tract
 4 cases 27
 Membrane Existence of c ps la t b l p gn cy 59
 M é e syndrome Ev l t n f 7
 Mening oma R ntg pict in ft t r m 37
 M gts Ot g s ch m th py nt m t f
 c mply t f ac te middl e r pp ratio
 p t t d 8
 M m t r rh gna Clin c p th l g cal in t g t of
 f 56
 M p us Ot poro aft 445
 M t ry Vas la oc l usio n 34
 M so l St dy f h rma f intram soc lic ari ty 47
 Met b l m Eff ct of thy x a d thy of p c borm
 b al d thy id t esp at n of r t t
 v ge
 M t t s s E ly diagnos of m lgn nt to p 89
 m n l gic l p ctu es due to of pulmo ry ca
 r 7 p phylactic a d c r eat tr m t f f
 malgn t t m rs of test cl 349 e r n lymphatic
 f om f colo 437 of p umary rcin ma f
 b t with f r e co to sple d nal gla d a d
 n s 58
 M t r rh gna Angioma f ut ru s l c use f 444
 M l d dr in g P t lit d p ogno f f
 c nt s 4
 M uth Interrelat f d astury nd surg ry in t e tm nt
 f d f rmit f f c and jaws se f adi p qu
 di gn t m dia in roe tige d gn s of gical
 co dit f pe oral ro nt p eatm t f mal g
 na t tum 90 seco d ry p f l ft lips nd
 th ur al d formit 4 mal gna of oral
 cavity 44
 M Exp r m ntal earch on o t g sis by c l
 rep r of bo 464
 M l spinner s can 53
 M scl Subc ta eo s tears in 67 p th lgy f ant n
 polyomy lit its relat to f t 68 chroni
 my t nd tend y ovit d t staphylococ 79
 cy t cus cellu s a e t t g g phic d tect
 u n and ce t l rv yst m 8 q tio f
 p r t pat n f thymu n myasth iag as p do
 p ralyt 86 paralys f r r t t r n c m
 pli t g dsl t of h uld 64 suit f
 surg l ite tm t of p raly f p rri blq e d
 perio r t s 4 distrib tion of les f b
 d joint thr gh w k w th mp sed m
 chnes with r f en e t th r localizat 46
 surg ry ju t fied i t atment f thym s f pseud

PAGETS diseases The time to fight it firmly 6
 P in Surgical methods f l f f chronic b
 dominal d t hypoglycemia 47 red cti of a d
 oth r u d bl reactions d e t p umo-e cph
 l raphy 315 exper i ces w th tramed flary
 tractot my rel f f f al d umm ry of perat
 res l 3 8 scutur in low back derangements it
 c de c s gnificanca and treatm t symposum
 352 surgical s gnifica ce f in bd m al wall 47
 mun ca salgi f l l ing injun s d w u d 49
 ph tom limb 499 in c cer of face jaws a d neck
 524 chordotom y 5 6 treatme t of in ca cin ma of
 cervix c llecti r ew 543
 P l t N pla ms f trum asopharynx d h d
 fa cre l cr sed f t a d decreas d rbohydrat p
 pette f rats from which has been rem ed 2
 d od al d t c l a d d ther complications w th
 ref re to t ro f 43 papillary cystade o
 carcinomas of 243 c rein m of h d f view of 4
 cases 332 effects of preparato s fr m n n r
 p t tary l be in experimental d abetes 400 gu l
 les ons f 44 c d n nd diagn s s of l thias of
 8 cases 539
 P cre t tus St des o 44
 P l l m f ch r d plexus 3 6
 P aly s Diagn t c s gnifica ce of partial off ial
 chron c pp rat t tismed a d m a t d t 9
 m scle pathol gy m t r i polio myel t s relati
 t f ct 68 facial f m fra t re f petrou bo
 121 u rcal t eatment f blat ral f abd ctom s
 cles a f serrat s anteri r m cl c m p lcat g
 d slocat on f h ld 64 re ult f g ual t c t
 m nt of f s peri bl q e d peri ect s
 m scles 47
 Parathy dectomy Hype pa thy o dism se w th se
 vere kid ey ch ges t eat d by 4
 P rathyro d gla ds T m r f w th ge ral c l nos 4
 P rot d gl d T tment f tum s f w th r f t
 total parot dect my 206
 Patell T eatm t f fract re f 65
 P l l gra, Cl cal ma fstatu s f t c acd d bo
 flavin defic e cy 394
 P l s X ray pelvian try f gene al se 55 labo
 t acted 50 mod m th py f labo pre f
 c tr t d 344 roe tgen radiat f i c m
 f cervix ut r 390 hyperal g s zo s i s ft p t
 ro d ympt n fr m pl xus hypogastricus 55
 P n u P yroni disease or fibro s c v rmitis 56
 P n arth us Roe t g n ther py scapul h m ral 389
 P n r d m Discu s n on chest j res 8
 P h dntu Thyroid with desc d g bsc f eck
 a d mediast t o
 P n i cum Prostat tomy and protactect my th gh f
 rem l f pro tat c cal l 347
 P n iost m Fibrosa c ma f 60
 P n iost t of pubic egi f l l w g s prapub cysto
 t my 346
 P n ipeul t s 3
 P n i tals T rapeut d rat i t bstru
 tio f small intestin p cuples f rg l pra t
 P n th l ma Cystic f t gu 309
 P n t eosc py Prese t tat f flecti ew 43
 selectio f cases f 430
 P n t m Experim tal st dy f val f a t perito
 t sera, 142 bd m al tra ma pa l d sc s
 99 absorpt by absorpti of gra lar balances
 431 accin to rrugat and chem th rapy f
 treatme t f experime tal pent nitis 43 p
 phyla tact m t f post perati ed ff se w th
 cines 43 xperim tal co trib tio t t e m nt f

due t perforat 433 ma g ment f cut perf
 ated appe d citi 57 l e of loc l m pl t b f
 cry t ill l ian l m de bout g tro- te tu alana
 t mos in d g s 535
 P rithes d sease A ept c nec o is f h ad off mur alt
 fracture of neck in childhood d ts rel t hpt 75
 P tro t Chem th rapy in tre tme t of ac te muddi ear
 pp tu me ung t a d 208
 P yronie s d fibrous ca ern t s 56
 Phantom limb 409
 Pharynx Trans ent bacte i m f llow g to sillectomy
 xpe im tal bact l g l d l calst d 3
 an f t l 3 pe dulous ret culosarc m f
 l i gult l 3 choce of a esth ia L d s
 gin 492
 Phlebittis Treatme t f of lowe e t m t w th pa e
 tebral n vocaine injecti s f l mb ympath tic
 ga gla-Le ich 47
 Phl gmas alb d l s Gynec l g l d p rperat
 th mbophl b t tra t d w th 45
 Phl gmo S bpe t ral 83 88 ubcut eo d et dph
 therna ba illi 28 clinic l o t rbut on t st dy f
 gastrit s w th 34
 Ph t raphy Experime t in x ray scree w th t l
 di ct roentg n graphs 286
 Pin al gla d f ctio s of 1 6 mecha ism of tu
 g ad t p p phys al fctor 4
 Pituit ry gl d S g ry of hypophysis 8 e docrn t d
 r bbt f l l w g sect f hypophyseal talk
 19 hypophyse l y d m f t matic orgs too
 infuse e fumpia tat f n ryelun t of
 s bstances p d g hyperglyc m or effect of
 preparat from tr n l b f experimtal
 p creat c d b t 400 m h m f a t g nado-
 t p c e p phy al fact 4
 Pl c ta Fl w f bl od t f t r vll pace of h ma
 6 t ansms th gh f t yp ma bru 558
 Plac t b lobata 448
 Pla tap ia re ult t e tm t f at C ty Gynec l g
 cal Clin c in E se y r s f m 19 3 to 1937 448
 Plasma T ansfus f blood d in alime tary h m
 h g 79 so-g l t titer f p led serum 164
 nfl ce of l d mag pr thromb co ntra
 t f d po t vitam n k 24 ch ge m
 l e associat d w th hype thyro d m w th t dy of
 l lof p th mb n pot perat perod 33
 l m f d p t co ce trat f alt
 h mo h g 395 t f f p rv d blood 44
 f o n d d ed f r vil d military s 499
 therape t al f p reserved blood 573
 Pl t u g y Plastic e trut f t losses f l
 low g gu th j es fl f d f al bo s 7
 cl re f larg h ul pct e by kin flap 234
 re l it w th fascia f nal incont 438 st ry f
 55 of rubbe lam na in plast c bridg e of e
 perm t l erv l 526 e me t l pnt d
 w th rubbe heets 567
 Pl th ra Abd m l path g es of acut abd m l
 y drome f pl ropulm ary d se 244
 Pl ra Tre tm t of tra mati b moth ax 25 role f
 experim tally p od ed adhes nsi in e trapl ral
 p m lys d pre t f su gic lat lec
 tas f a imal 30 bl t rat f sp c in f l l ung
 p mo ect my 37 l cal d st tistic l repo t on
 93 w d f d l g a 3 be gnt m r s lo ry
 associated w th sces d flu fr m 334 expe
 m t l t dy f prod to f adh f 4
 dra nag f 580
 Pl ritis Aseptic xperime tally p od ced
 P matoc l occ p talis 49

- Pneumococcus*, Three hundred cases of acute empyema thoracis (132 from streptococcus and 168 from), 130
Pneumo-encephalography, Reduction of prun and other undesirable reactions due to, 315
Pneumonolysis, Role of experimentally produced intrapleural adhesions in extrapleural, and in prevention of surgical atelectasis in animals, 30
Pneumothorax, Extrapleural, 31
Polioarthritis, Muscle pathology in anterior, its relation to function, 68
Polycaritis during pregnancy, 240
Polypeptides, Behavior of serum, in puerperal state, 153, in serum during normal gestation, labor, and gestosis, 557
Pregnancy, Laboratory investigations in ectopic, 50, existence of capsular membrane in tubal, 59, edema of, 60, pathology of heart disease in, 60, flow of blood out of intervillous space of human placenta, 61, effect of, on experimental hypertension, 62, skin test for diagnosis of, 151, uncommon causes of extra uterine, 151, toxemias of, in theory and practice, 151, x ray pelvimetry for general use, 155, question of intra-uterine transmigration in tubal, 249, intra abdominal hemorrhage from spontaneous rupture of subserous blood vessel of uterus during, 249, polycaritis during, 249, objections to induction of labor in normal women during, 250, labor, and puerperium in macacus cynomolgus, 253, "pressure theory" of eclampsia, collective review with selected briefs, 336, ovarian rhythm during, 342, ocular complications in hyperemesis gravidarum, 342, evaluation of treatment of albuminuria of, by water balance method, assuming theory of water intoxication in, 342, investigations on kidney of, 343, shotgun wound of uterus during, 344, results in treatment of placenta previa at City Gynecological Clinic in Essen in years from 1923 to 1937, 448, fate of fetus after threatened abortion, 448, placenta bilobata, 448, daily variations of blood urea in albuminurias of, 554, study of hepatorenal function in toxemias of, 554, histidine metabolism in normal and toxemic, excretion of histidine in normal urine of, and in urine of patients with toxemia of, 554, significance of isolation of histamine from urine in toxemia of, 555, role of vasopressor and anti diuretic hormones of posterior lobe of hypophysis in pathogenesis of late toxemias of, 555, polypeptides in serum during normal, labor, and gestosis, 557, toxemic, in relation to subsequent, renal function tests, 557, placental transmission of trypanosoma brucei, 558
Principles of surgical practice, Therapeutic considerations in acute obstruction of small intestine, 1, anoxia—its surgical significance, 105, abdominal traumas, panel discussion, 299, surgical bacteriology, 403, management of acute perforated appendicitis, 507
Procaine, Reactions to local anesthetic agents, experimental studies with, 586
Prolapse, Post-traumatic subcutaneous intestinal, 435
Prostatectomy, Total perineal, modification of previously published technique, 257, 100 cases of transvesical, 458
Prostate gland, Experimental hypertrophy of, 157, new ideas in regard to pathogenesis of adenoma of, 347, transurethral resection of, 347, perineal prostatectomy and prostatectomy for removal of calculi in, 347, resection of "large", technique and results, 457, studies on modifications of genitalia in female guinea pig by action of extracts from, 598
Prostatism, Significance of hypertension in, with chronic urinary retention, 257
Prostheses, Problem of war amputations, 171
Protein, Lymphatic pathway for absorption from naso-pharynx, absorption of dyes, absorption of, absorption of viruses and bacteria, 313, plasma volume and plasma concentration of, following severe hemorrhage, 395
Prothrombin, Influence of liver damage on concentration of, in plasma and response to Vitamin K, 240, changes in liver associated with hyperthyroidism, with study of level of plasma, in postoperative period, 330, blood levels of, in newborn, 345
Pseudarthrosis, Anatomical study in case of, of femoral neck cured by intertrochanteric osteotomy, 466, of carpal scaphoid, treatment by bone graft, 567
Pseudomelanosis, Small hemorrhages in gastro-intestinal tract, with reference to their relation to, 40
Pubes, Periostitis following suprapubic cystostomy, 346
Puerperium, Behavior of serum polypeptides in, 153, bacterial content of uterine cavity during confinement, 153, treatment of tetanus in, report of cured case, 252, pregnancy, labor, and, in macacus cynomolgus, 253, use of sulfonilamide preparation in, 451, gynecological thrombophlebitis in, contrasted with phlegmasia alba dolens, 451, thrombophlebitis in, 556
Pyelograms, Body section, in children, 183
Pylorus, Experimental studies on production of pernicious anemia by operation on digestive tract, results of combined elective resection of pylorus and Brunner gland section of duodenum and distal two-thirds of small intestine on pups, 541
R
RADIOSENSITIVITY of bone marrow, 503
Radium, Physical study of intracavity therapy with, 92, treatment of cancer of uterus with, 93, 177 cases of primary carcinoma of vulva, 246, five year end results in cervical carcinoma treated with, and 800 kilovolt roentgen rays, 293, treatment of epulis, 293, Radiumhemmet experience with radiotherapy in cancer of corpus of uterus, 392, treatment of carcinoma of breast by interstitial irradiation, 495, treatment of non malignant conditions with, 593
Radium-beam therapy, 391
Radius, Treatment and end-results of fractures of head of, 162
Rectum, Pride and prejudice in treatment of cancer, 99
Rehabilitation of injured, 380
Resuscitation of newborn, 252
Reticulosarcoma, Pendulous, of lingual tonsil, 311
Retina, Treatment of thrombosis in central vein of, with heparin, 411
Rhabdomyoma of tongue, 415
Riboflavin, Clinical manifestations of nicotinic acid and deficiency of, (pellagra), 394
Ricard's operation, Some remarks in favor of, surgical conduct in crushing of foot, 381
Roentgenography, Use of radiopaque diagnostic media in diagnosis of oral surgical conditions, 11, study of pulmonary atelectasis, 29, single congenital cyst of lung, 33, significance of aneurysm of abdominal aorta masquerading as primary urological disease, case reports, 63, growth of epiphyses, 67, some cases of soldier's fracture, 85, aspects of postoperative pulmonary complications in relation to their genesis, 86, diagnosis of neoplasms of air and food passages, with reference to larynx, 91, recent progress in arteriography, serigraphy and photoradiography, 92, duodenal diverticula, 143, pelvimetry for general use, 155, cysticercus cellulosa—its detection in musculature and central nervous system, 181, mass, of chest, *et al.* (Faculty of radiologists presidential address), 181, oral cholecystography, basis of standardization of method, 182, cholangiography, 182, body-section pyelograms in children, 183, acute osteomyelitis followed up by examination during

co rse of conservative bologic l tre tment 36 e
perum ts in c n ph t graphy with c nt of di ect
286 experim nt l of malf fragm t f gla
la tion to hum n eye 286 as d gno t c d n nary
l n 64 c sea 286 intra abd minal c l f
to int rp tati f its utgenolog cal manife t
tions 287 luc f th gr phy f sho lder joint
88 pi t einmeningioma ifent r m 37 primary
tum rs fl gs d roentge thr py 3 dff
ntat on of b h g c c a c omas 32 d gn is
f p taneou fist l betw g ll bladder a d d
d n m ca sed by bulia y l l 33 d ert culum
l ke form t n in choledo hu d m nst t d by chol
gography 33 w tunc mlt r y 380 as g
d ty of re l sh d w d n ge cret graphy
s gn f t etericob tru t 387 a pe t f g t
ll tum rs f bones tre ted w th oc tg urr diat n
387 a throg phic t des o nkl j t 388 m i
f t t s of art cl sus of bra ches f abdomen l
ort w th eferen t c lificat n f b ches of
lac xis 383 atyp l g nalule t tgeno
l gic ll mut t 389 p m ticle c ptals 49
tub rculous c vitati nd t pl rld mpre
sion 4 bp rtt s nautical p des 467 f
mbol m f xillary t ry important of ret g ad
t ogr phy 472 in tig tion f tra mat c lung
h nge rs of bl t l to th 494 d gn
of tum rs of m ll bow l 494 tech q ndic t
dr lts of m y l gr phy 54 s c ll d spon tan
p rfo t n f kld y p lvi 56 stat t d analy
f 200 c s f b e and j t tube ul s 564
mas of th its pplicat o t recrui f army
579 d agn f gall t ileu 583 m di gn sus a d
t e tm nt f p m ry malon t bone t m 589
pseud f ct d s affecting skel t y t m
59 f f m pat llar t c lat d ag d po
j tion f kn e 59
R e t g n r y l d t n of m lt pol ll di n with
dit po ble gnific c 59
R tg th py Of m hgn t trum s tre t d or not
t d by p r t n 3 d vlopment of ce of
techniq f o t tme t f tub cul vical
lymph ma lat r lt n 23 sest eated p rly sur
gic lly p rly r d l g cally 3 d t by of
h red t ry h ge in m ce 84 t t t c l lt f
decad f r diat on t tm t of tumo f t als
84 f ctm my o 9 in cnc of kun 29
pe or f f m lgn t t m 290 m gment f
c cer f br t with p op rat d po l p at
9 tran th ic of c f soph gu o t t
m t of carc ma f ry mp met f r lt
with post pe t 9 rum chol t ol d r radi
t s k s 9 f y rend sults n r vical r
c m treat d with rad um nd 800 kil olt 93
react of l ryng l t su f llo wing tend d f c
t l 34 p m r y t m flungs t dy diag
d 3 w tum mlt ry 38 t g n spe t
of g t cell t m f bo s t t d w th 387
sc pl hum ip r n thrt 389 rad t vity f
tumo 390 lt of d th rapy f hypopharyn
g alc c t Radi mh mmet St ckh lm f m 93 t
939 390 f pelvis i cin ma of rvix ten 390
fact f f em al n k f ll wng f r gynec l gl l
malu ma y 446 d g s f f with t b opsy f bra
t m rs in ch ld ea g 53 f nslam t y p o c e s
50 f ll lts f ffac nd ne k 50 f f t f po
inf t pod d n kn of bbt w th ltur s f
st ept ocush m lyt sand t phylococ c eu
59 alu f by m th d f C t d m te tme t f
f t ru 59 b t q t tat e

munati n of h man b op y material taken from
irradi t d a cin m s 59
R u d worm Infestat n with m s ge y 95
SACRUM D s f ac r l c j t w th d
t n of inflam tory d sea d th r rign 7
S r ma Prum ry of omentum 39 act of dry
he t W d s 100 g bl t g 2 g
gr nul t 190
S apula Co g nat l l ation of 68
Sci at a Pain low b k d rangement t inc de
gnica ce nd t tm nt ympos um 352
S mm lw in otes of h t mp arnes 193
Sept emus T tme t of r l b f and s adv t
of sulf mud c mp unds 88 t tm nt of staphyl oc
cal w th l f m thylthia le d lfath l
cases 89 mmun t sf son in cut 83 staphylo
cocci 399
S rum Phytol eact ns of som blood 78 expen
m nt l st dy f v l faanti pent t 42 b h v r
f polyp ttd f m p erper l st t 53 g l
tun t l f pool d pl sma 64 chole l f
d r r d tion s k s 92 act of dehydro
t chst r up som l t lyt nd po 8 gly ro
pho phat of m ca f d p th c t any 97
treatme t f fract w th tumulating dose f u
ticular r y t xic 364 u of n treated pool d
h man d p l d ly phl in tre tm t of hock
475 polypept d in rum d r g rmal g tato
l b d g t s 557
Sh k Duagn d t e tm t of sec nd ry st dy of 4
s primary dsec dary ase m t of erly
t tm nt d s m t f eco y hem t logi l
p ct 87 xperim t t um t le t d tem
p t e d 75 d t rm t f blood l m
p t ts w th 74 c l t ry c llapse d w d
274 bdomin l t auma p ldis 510 prin ple
of rgal p tce 99 bl od d blood b t t
nt tm t d p e ntion of w th fecet th r
u w r f 377 tides n bly f v n
d m of t xedrug 395 u fconce t t d po led
humans rum d pool d lyophul serum t tm t
f 475 f ad noco t c l xt ct in t eatme t f
tr umati f burn 476 comp r n on f f e t of h t
nd th f cold in p n d r tm t f 489
q ant tat a pe t of tr f n t f f for
h morrh g a d w nd d g s f tra f
t l l f d ge 57 t tm t f w rtm 58 ol
of ad rgl d t le of d soxy rt t o e
act t in p t n f p e t e 584 eff t f re
plac m t th py in experim tal 584
Sh t w the py Symp l m ju c d by
g lat o 66
Sh l d Co g tal f v t of s pula 68 cal f 6
of prasp t t do w eatm nt f
p rlys i rat s t orm cl mplicating d
lo t f f 64 al f arth gr phy f 88 tre t
m t f b l l f d l t 36 o fge
th py n s pul h meral p r thnt 389 l um
depo t d s b m l b u t s c e 465
t atm t f h b t l d l t o of 468 gu h t
wou d f 483
Sh vel w k s d s I ang f eq n y f fra tu
f fun l p ase n sh el wo k 469
S lk L tuc f f in p t r p rope t f d t
guin l h ru 47
S s T m t t f t phyl c l th omb phl b t f
c rno w th h p r m nd h m th py 8 primary
t ma f f ontal c t d c emou a eury ms
6

- Sinuses, Branchial cysts and, 209
- Skiers, Fractures of tibial spine in, 470
- Skin Pride and prejudice in treatment of cancer, 99, test of, for diagnosis of pregnancy, 151, radiation therapy in cancer of, 200, sunlight and cancer of, 397, progressive postoperative gangrene of, 501, hyperalgesic zones in soft parts around pelvis as symptom from plexus hypogastricus, 551
- Skull, Chordoma of basi occiput and basisphenoid, 4 cases, 206, surgical aspects of lightning stroke, 278, treatment of infected shotgun wounds of, and brain in military hospital, 480 osteomyelitis of frontal bone, 3 classified cases, 517
- Sodium light, Eyeground under, cases of old trauma with loss of vision in one eye and lesions of eyeground in other, 308
- Sovaine, Use of, for local and spinal anesthesia, 386
- Sphincter action of larynx, 124
- Spinal anesthesia, Continuous, 386, use of sovaine for local anesthesia and, 386
- Spinal canal, Pyogenic infections of spinal epidural space, 525, emergency laminectomy for acute epidural abscess of, 526
- Spinal cord, Diagnosis and therapy of chronic compression of, with special emphasis on tumors of, 20, technique, indications and results of myelography, 524, chordotomy, 526, treatment of pain in carcinoma of cervix, collective review, 543, bullet injuries of, and their management, 579
- Spine, Dislocation of first cervical vertebra, 73, fractures and dislocations of cervical portion of, review of 89 cases, 75 early diagnosis of malignant metastases to, 189, tuberculosis of, and its cure, 260, changes in following tetanus, 360, sciatic pain in low back derangements, its incidence, significance, and treatment, symposium, 352, increasing frequency of fractures of processes of, in shovel workers (so called shovel workers' disease), 460, follow-up study of effects of vertebral osteosynthesis for tuberculous spondylitis, 564
- Spleen, Traumatic secondary hemorrhage of, 146, contribution to our knowledge of surgical diseases of, grave anemic syndrome due to diffuse hemolymphangi endothelioma of, with total disappearance of splenic parenchyma, 147, researches on patients splenectomized because of trauma, 148, aneurysm of artery of, 184, does acute virulent lymphogranuloma exist, 188, permanent good effect of ligation of splenic artery in ascitic splenohepatic syndrome, 332, metastasis of primary carcinoma of breast, with reference to adrenal glands, ovaries, and, 528, rupture of, in two stages, spontaneous rupture, 541
- Splenomegaly, Hyperemic, increased hemolysis, increase of fibrinogen, and accelerated sedimentation of red cells, 538
- Splitting, Purposeful, following injuries to hand, 279
- Spondylitis, Septic, 7 cases, 466, follow-up study of effects of vertebral osteosynthesis for tuberculous, 564
- Spondylolisthesis, Sciatic pain in low back derangements, its incidence, significance, and treatment, 352
- Staphylococcus, Treatment of cavernous sinus thrombophlebitis from, with heparin and chemotherapy, 8, treatment of septicemia from, with sulfamethylthiazole and sulfathiazole, 12 cases, 89, chronic myositis and tendosynovitis due to, 179, septicemia, from, 399
- Stellate ganglion, Anesthesia of, in treatment of postoperative pulmonary complications, 490
- Sterility, Subsequent investigations of patients operated upon at Clinic from 1928 to 1938 for, due to tubal occlusion, 246, therapeutic value of tubal patency tests in, and infertility, 445
- Stomach, Experimental studies on palliative operations for perforated peptic ulcers, 42, bearing of secretory mechanism of, upon surgical management of ulcer of, and duodenum, collective review, 133, diverticula of, 234, fatal bleeding from ulcers of, or duodenum, 236, results of resection of, for perforation of gastroduodenal ulcer, 236, experimental studies on production of pernicious anemia by operation on digestive tract, survey of results of total gastrectomy and resections of, 237, changes in gastric acidity caused by cholecystogastrostomy and cholecystoduodenostomy for calculus of bile tract, 324, clinical contribution to study of phlegmonous gastritis, 324, use of clinical material for investigation of cancer of, 325, trend and geographic variation in cancer mortality and prevalence, with reference to cancer of, 326, gastric function in ulcer of duodenum, 434, fibroma of, 434, experimental studies on production of pernicious anemia by operation on digestive tract, results of 3 types of combined elective resections of, and duodenum in dogs, 442, ascorbic-acid deficiency in diseases of, incidence, diagnosis, and treatment, 533, factual considerations in early diagnosis of gastric carcinoma, 533, diagnosis of chronic gastroduodenal ulcers based on 1,000 radical gastric resections, 534
- Streptococcus, 300 cases of acute empyema thoracis (132 from, and 168 from pneumococcus), 130
- Struma, Cystic hemorrhagic, of adrenal gland, 453
- Sulfacetimide, toxicity and efficacy in gonorrhea and urinary-tract infections, 562
- Sulfadiazine, Absorption, excretion, and distribution of, (2-sulfanilamidopyrimidine), 399
- Sulfamethylthiazole, Treatment of staphylococcal septicemia with, and sulfathiazole, 12 cases, 89, local use of sulfanilamide, sulfapyridine, and, 179, encephalopathy associated with, therapy with, 190, observations on absorption, excretion, and distribution of sulfanilamide, sulfapyridine, sulfathiazole, and, 296
- Sulfamide, Treatment of septicemia, results before and since advent of, 88, anti-bacterial effect of preparations of, 281
- Sulfanilamide, Local use of powder of, and hydrogen peroxide in wound infections, 89, local use of, sulfapyridine, and sulfamethylthiazole, 179, observations on absorption, excretion, and distribution of, sulfapyridine, sulfathiazole, and sulfamethylthiazole, 296, absorption of, from burned surfaces, 385, nervous injury produced by, and some of its derivatives in chicken, 399, use of preparation of, in puerperium, 451, management of acute perforated appendicitis, 507, value of local implantation of crystalline, about gastro-intestinal anastomoses in dogs, 535, in osteo-articular surgery, 567
- Sulfanilylguanidine in treatment of acute bacillary dysentery in children, 399
- Sulfapyridine, Treatment of staphylococcal cavernous sinus thrombophlebitis with heparin and chemotherapy, 8, treatment of gonorrhea with preparations of, (M B 693), 157, local use of sulfanilamide, sulfamethylthiazole, and, 179, observations on absorption, excretion, and distribution of sulfanilamide, sulfathiazole, and sulfamethylthiazole, 296
- Sulfathiazole, Observations on absorption, excretion, and distribution of sulfanilamide, sulfapyridine, and sulfamethylthiazole, 296
- Sulfonamide, Intracranial use of, experimental study of histology and rate of absorption, 282, relative value of, and antisera in experimental gas gangrene, 283, uses and abuses of, 295, absorption and excretion of, applied locally, observations in rabbits, 498, therapy for

ac t of tis media and mastoid tis with 59 local
conce tration of compou ds t inserted to wounds
maxim m concentration in wound fl t co centra
tion i d tal parts of wou d and i tis ues rou d
wound 59c

So light nd cane r of skin 30

Sanguis Pulmonary processes with 42

Surgery and basic sciences. Peripheral circulation includes lymphatics, 105

re primary repair of the done 381 has World War
definitely decided in favor of necessity of blood
vessels 422

Sweating Tests of getati elu ctio sterpost tr umatic
dystrophy of extremities of

Sympathetic nerves Tests of action after post traumatic dystrophy of extremities 66 gastrodysmotility and hepatolenticular degenerative disorder 11 wingless on of abdominal 527

Sy via Clinical picture and treatment of tumors of 31

Syphilis, Surgical treatment of optic atrophy due to
survey of 68 cases of traumatic chancres, 66
increased resistance in rabbit following pro-
administration of binary estrogen
of estrogens on the male rabbits
reaction to treponema pallidum in female rabbits
in elutriated blood of red blood cells
blood banks (4 esophageal obstruction due to
gummas of esophagus and diaphragm)

TEMPERATURE An 21 —its surgical significance
 Principles of surgical practice of red ced ins rg ry
 urry of lumb. 105

Tendons of right myot my in the tm nt f d wled fl r
of hand 72 chronic myositis d tenosynovitis due
to staphylococci 179 calcification of s p aspinatus
new treatment 260 primary repair of 314 malign nt
1 more f the ths f 566 experiment tal peritend
nitis with rubber sheath 567

Tendosyn vitis Chro le myositis and d to st phylo-

Tentorium. Eosigen picture in the interior of a z

Test, Therapeutic 1 of tubal pat cy in sterility 1
1 fertility 445 ba t rial are se critiq of method
heret fore used f rd mon trating ba t rial rease and
presentation 1 v l l nd m re sensiti study 1
ureolytic action 1 ba t rial of sig acane in gen to
urinary infection 461 holic tho s and techniqu 1
labor see

T 11a 30 cases of low implant descent of treated by hormones 66 prophylactic and curative treatment of metastases of malignant tumors of 349 tons run, 99 cases of cryptic tumor in the treatment of the surgical division of Zurich Children's Hospital from 1973 to 1977 485 malmarital tumors 1450 tons of Ley 2.2 cases with a few women of known cases of hyperplasia in the uterine endometrium.

Testosterone propionate. Effect of long term stimulation of
male and female rats with estrone estradiol benzoate
and androgen treated and untreated

Tet 2. Avertin treatment 1/377 treatment 1/300 special report of cured 2 se 35 active immunization again t ga gt. there and 75 cl' treatment in 1000 cent secal se cases with net mortal ity rate of 10 per cent 250 ch - 250 pc followi g 3/50 stability of th t. for unlar e another let rag and then 3/79 t. led for prophylaxis, 4/6 prophylaxis of 5/5

T. y. Action of d hydrate A. n. types were electrolytes and upon β glycerophosphate of serum I
C. e. d. *biochimica* 227

Theca cell and its tropism toward the surface typical
feature of growth human and mammalian follicles, 285
Thekin Survey of estrogenic dosage collective review 49
Thyroid Nursing conditions of or ovarian testis
of 14, 45

Th racoplast with extrafascial apc lvs 129

The treatment of traumatic hemothorax is intrapleural pneumothorax if diagnosis is surgical.

bl t rat n f pleural pae fill g pneumococ

tomy 37 discus sion n chest i j es 9
 phlegm 88 a b p e c t r a l phlegmon 88 ma rad
 graphy of l al (E culty f radi logs pr le
 tal address) 24 l l minal pl thorax patho-eneu
 sacul bel m l l yndrom of pleuropulmonary d
 ease 244 c l ual c n d ration f anesthesi a tra
 thoracic operations, 254 p e p l e u n t 222 e p e r i
 me tal i ty f p r o d c t i o n f l e u r a l a d c l o r s 4
 treatm nt of th racopulmon ry wounds, 481 rosten
 ologic l i n t e s t g a t f i t t u m a t i c i n g c h a n g e s f m
 bl t i o l e c t 404 d p h r a g m t i h e r n 53
 clinical t l y of thorac-abdom l reflexes ad
 trauma to pari tal 53 m m s r o c t r a p h y of i t
 applicati n t r e c u r s i f r m m y g n s o m p e c t s of
 closed wou l s of ch st 580 a d l o m t h r a w k
 h u r i e s 450 d r a i n a g e f l e u r a 450

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266

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on basal metabolism and respiration
at various ages
1. Iodine: surgical, chemical
principles of practice, treatment
operative technique
2. Iodine: patient with thyroid disease
3. Iodine: hormone of bone and
calcium
4. Euthyroidism in hyperthyroidism
5. Management of hyperthyroidism: medical
conditions, changes in liver, spleen, heart
6. Hyperthyroidism with study of plasma protein
levels
7. Immediate postoperative period
8. Management of AIT

Thyrm EF et al. Thyrotropic hormone on basal metabolism and thyroidal iodine regulation

metastasis and a lymphatic system. The lymphatic system is a network of vessels that carry lymph fluid, which contains white blood cells, throughout the body. It is a part of the immune system and helps to fight off infections and diseases.

Tula tract res of spin

Tongue Allergic factors in etiology and symptomatology of acute larynx of review with pathological anatomy, 123
carcinoma of larynx and with consideration of cases

[illegible]

Ureterocele 2

Ureterolith t my V ginal 346

Urethra Urin ry inco tin c rel d by restorat on and
ma t nance of n rmal pos t f 56 perat e
torat n of large defect f bladder base bl dder eck
and 64 diverticul m off f mal 346Urinary Tract Some pr blems in ma gement of calculi in
63 body sect n pyel grams in ch ldre 83 s rgery
f inferior e conditions affecti g 455 im
medi t post perat e tre me t and fight gain t
recurre c i operat ns f est 456 frequ ncy f
complicati f in pat ents with ost o- ricular tu
berc loss 463 penum tal res rch n ost oge ess
by s cal mucosa i repa of bo es, 464 ulf c t
m de toxicity and effi cy in g rth a and infecti
f 562Urine Implant ti n f p t itary gla d luminat n in
of substa c prod c g hyperglycemia or

Uroge tal tract Tubercul sis of 349

Urography I creasing density f alshad w d ring e
creti sign f cute ureteric obstructio 387Uterus Traumat c perf rations f 55 comparati v n
vest gat ons of acti ff male and mal ex h m res
and s prare l c rtx h m res 55 tra sabd m
final p ctur f f diagn sis f hyd t d f m mole
61 radium treatm t f cancer f 93 n t lity a d
carcinoma f cervix 49 role of deep cauterizat on in
pre tion f cancer t c r v x 149 physiol gy of in
labor 52 bact rial c t t of cavity of d n g con
fiment 153 perative c rrect on of d placem t f
a d result U ersity s Clin c for W men t H I
s k i n ye rs 1930- 937 154 fi e ye d res lt in
cervical carc oma tre ted w th rad m a d 800 kilo-
volt roe tge rays 293 solid 334 effect f foll cula
h rmo upon f cti of humia myom tr m 314
sh tgon w und f preg t 344 roe tge irradiati
f pel r carc ma of cervix of 39 Radi mhem
m t xperi c m with rad otherapy in can c f corpus
f 392 synops s of physiol gical in est gat n r gard
1 g m tor f cti f in gra rd rg m 443
gi ma f s u s al cause of m t orrhagi 444
comme t s o treatme ta d seq elm f carc ma of
444 lue of c icum in l bor d i inertia of 448
tre me t f pa in carcinoma of c llective r view
543 study f c rpora lute a d end metrium pa
ti ts with fibro d of 549 diagnostic value of g al
sm es in carcinoma f 549 c rcinom of c rrix of
in childhood and ad lesc ce 549 statistical tud es
on val e froctige therapy by m thod f Co t rd in
treatment f ca of 59VACCINATION P nteonal irng t on chem therapy
and i tre tment f experimental pent itis 432Vaccines I prophylacti treatme t of postoperati diffuse
pent itis with 432Vagin Ureterolith t my thro gh 346 cytolog y of d
vari n fu cti n i w man 55Varices, Treatm nt f sophag al, by njectio facieros ng
soluti n 37

V selinoma, Late re ults f, 306

V s, Explorat on and divi on f fem ral a d iliac vein
in treatm t f thrombophleb itis f l g 77 s posed
acti mo eme t f walls f peripheral 103 B ce
of trauma of operation blood press re in, 583Ve ca a, Co d i fa rable f air mbolism aft r
opening f inf no 367 rg ry of inf n n rologi
cal co ditons, 455V ruses Lymphatic pathway f bsorption from naso-
pharynx bsorptio f dyes absorption of proteins
bsorption of and bacteria, 3 3Vas on Eyegro d und sod m light c ses f ld tra ma
w th loss f e y d i s ns of y ground in
ther 308V tallum O bital impl ts with special r f re ce to use
of 412V tamin Immed ate acti n of Vitami B blood cra is,
77 d m t t of V tamin A d fci cy in m or
study f V t mun C trit an g m p f school ch l
dren 186 influ f l i v e dam ge o pla ma pro-
thromb n concentrat n d espo set Vitami K
40 polyn untis during pregnancy 249 correlat
f result f b photometer test with V tamin A c
te t f h m blood 37 V tamin B complex and
adren lect my 394 oral adm n trat on f synth tic
V tamin K (2 m thyl 4 aphthoq no e) 394
trit o al factors i d k d p tati n 394 Vitami K
dministe ed to m ther duri g l bo as prophylax
ga t h m rri ge in e born inf t 45 and re-
ticul hi tocyt sy tem in heal g proc f wo nds
497V l a, O e hu dred and seventy se en cas of prun ry
carc oma of 246WAR Organizati d import f gical aual
y army 80 gu hotwou ds f he d 104 8
pr at cal xperi d critical c d rations in
tre tm t of gu sh t w ds f j w 8 p lmo ry
c cuss (blast) d t h g explos 8 d c u
si n ch t juries 82 som cas s f sold 8 d c u
ture 85 diagno is d tre tm nt fs d ry shock
at dy f 24 cases primary and se d ry shock
assessm t f se enty treatm nt a d assessm t of
recovery hem t l gical aspect 87 l al t tist cal
report o s patie t w th ca oce ebral w u d
Span h f m 936 t 939 126 a r n of n w men
40 synpo moninjuri caused by g lat 66,
military s rg ry 167 experie c s an f m s rgic l
d l on of bas hospit l 60 imbedded m s l tr
m tism operat e rem al of imbed led mussl s 169
probl m f amp tat f 17 ce mment u s n
s rgery off c wou d in 17 pl c reconstruction f
t s s loss s f l l w i g gunsh t i j nes of f ce d
facial bon 73 gu h t wou d f lung 73 eme
g cy medical servi e a d fut 103 delay d col
lapse ft head inj ry case records 4 g eral
principles of tre tm t of rad c lit s 269
problem f blast inj ry s 69 cri h i j r i s with
impairm t f re l i h e t i 27 gu shot fractures,
272 ct e imm uzati n agai t gas gangre e a d
teta 273 experie nces w th ga gangre e in f i d
from f i d h p tal in W t 273 c rcul t ry coll pse
a d w nd shock 274 Londo u der bomb rd
m t i some med cal aspects 371 app rently tral
h d j nes p linary tre tment a d xam atio
r lts and pathol gy practical poi ts in at m nt
371 surgic l and d tal treatme t f fract es f up-
per and low r jaw in 9 cases 373 ds f nerv
ous system in 373 pulm nary cuss on (b l a t)
375 w ds f k e j t wou ds seen w thl six
hours w u ds se n lat r sepl losed pla ster 375
blood d blood substit tes i tre me ta d pre n
tl of shock with reference t th r uses f 377
treatment f oo wo nd d b rns f 377 tab lity of
t tanus titoxin der subopt m l t rag c d tio s
370 reb l i t t f i ju d 380 milit ry roe tg
ology 380 shou l f resh bull t wou d f bra n be
sured red 47 xperi ce f Canada Army d pen
io s board with amput ti s of low r tre m ty 470
treatm t f gunshot w und 476 surgery f raid
casualties 477 has W rid dunn l y decided in f or

- of necessity of suture of blood vessels, 477, repair of lacerated eyes, 478, emergency treatment of injuries of, 478, face and jaws, 479, gunshot wounds of jaws, their treatment and prognosis, 480, gunshot wounds of heart, 482, abdominal injuries, 482, gunshot wounds of shoulder joint, 483, gunshot fracture of clavicle, 485, March fracture, report of 3 cases, 486, new developments in treatment of compound fractures, 487, transport of patients and wounded by air, 487, isolation hospital for gunshot fractures, 488, preparation of wounded for transport from aid stations close to combat zones, 488, frozen and dried plasma for civil and military use, 489, clinical study of non-penetrating wounds, 576, results of primary treatment of wounds in front lines and of treatment of various types of wounds in base hospitals, 576, refractory gonococcal infections, elimination by combined artificial fever and chemotherapy as related to military medicine, 577, rapid identification of gas gangrene anaerobes, 577, surgical problems of, 578, treatment of wounds of face and jaws, 578, bullet injuries of spinal cord and their management, 579, mass roentgenography of thorax, its application to recruits for army, 579, some aspects of closed wounds of chest, 580, drainage of pleura, 580, abdominothoracic injuries, 580, compression treatment of crush injuries of limbs, theories of cause of renal failure, 581, treatment of compound fractures resulting from enemy action, 581, treatment of shock in time of, 582, casualties from western desert and Libya arriving at base hospital (flesh wounds, hemorrhage, chemotherapy, fractures, amputations, wounds involving body cavities), 582, indications and contraindications for airplane transportation of sick and wounded, 583
- Women, War injuries in, 149
- Wounds, Gunshot, of head in 1940, 81, practical experiences and critical considerations in treatment of gunshot, of jaw, 81, local use of sulfanilamide powder and hydrogen peroxide in infections of, 80, clinical statistical report on 51 patients with craniocerebral, Spanish war from 1936 to 1939, 126, clinical and statistical report on 193, of pleura and lungs, 130, military surgery, 167, war experience from surgical division of base hospital, 169, recommendations on war surgery of face, 171, gunshot, of lung, 173, angioblastic sarcoma originating in granulation tissue, 190, antiseptic in brain, experimental study of histological reaction of cerebral tissues to various antiseptic solutions, 214, general principles of treatment of air-raid casualties, 260, treatment of superficial injuries and burns of hand, 279, chemotherapy in experimental gas gangrene, distribution of drugs from infected, 282, abdominal traumas, panel discussion, 299, injuries of eyes, 307, shotgun, of pregnant uterus, 344, war, of nervous system, 373, treatment of 100 war, and burns, 377, chemotherapy and infection of, 378, should fresh bullet, of brain be sutured, 417, treatment of gunshot, 476, treatment of infected shotgun, of skull and brain in military hospital, 480, gunshot, of jaws, their treatment and prognosis, 480, treatment of thoracopulmonary, 481, gunshot, of heart, 482, gunshot, of shoulder joint, 483, minor causalgia following injuries and, 491, injury and internal disease, 497, vitamins and reticulohistocyte system in healing process of, 497, absorption and excretion of sulfonamides applied locally, observations in rabbits, 498, traumatic epilepsy after gunshot, of head, 522, clinical study of non-penetrating, 576, results of primary treatment of, in front lines and of treatment of various types of, in base hospitals, 576, surgical problems of war, 578, bullet injuries of spinal cord and their management, 579, some aspects of closed, of chest, 580, casualties from western desert and Libya arriving at base hospital (flesh wounds, hemorrhage, chemotherapy, fractures, amputations, wounds involving body cavities), 582, camel-bite lesions, 585, local concentration of sulfonamide compounds inserted into, maximum concentration in fluids of, concentration in distal parts of, and in tissues around, 585
- Wrist, Why and how should a false joint of carpal scaphoid be operated upon, 460, pseudarthrosis of carpal scaphoid, treatment by bone graft, 567

- Phillips, F, 284
 Phillips, F J, 37, 221
 Phillips, G, 127
 Picken, L E R, 572
 Pignatelli, G, 148
 Pignoli, R, 59
 Pinotti, O, 491
 Piroli, G, 554
 Pitkanen, H, 154
 Platz, J, 335
 Plotke, F, 441
 Pollock, G A, 363
 Popper, H L, 441
 Postlethwait, R W, 543
 Prati, M, 126, 130
 Pressman, J J, 124
 Priolo, V, 187
 Prince, C L, 460
 Pulaski, E J, 45
 Pund, E R, 39, 398

 Queen, F B, 238
 Quezada, J J, 524
 Quill, L M, 396
 Quinlan, W S, 216

 Ragins, A B, 441
 Rakovec, S, 349
 Ralph, R D, 519
 Ramos, J, 297
 Ransom, H K, 507
 Rasmussen, H, 211
 Ratzenhofer, M, 444
 Rea, R L, 411, 478
 Rebaudi, F, 572
 Rechne, M, 446
 Reding, R, 596
 Reed, G B, 282, 577
 Rehn, E, 37
 Reich, N E, 234
 Reichert, F L, 415
 Reid, M R, 325
 Remington, J W, 400
 Reussi, C, 462
 Reuterwall, O, 392
 Reznick, S, 189
 Rhoads, J E, 476
 Richards, R K, 240
 Richardson, A M, 445
 Richter, C P, 102
 Ritter von Baeyer, H, 171
 River, L, 441
 Robacki, J, 267
 Robb-Smith, A H T, 277
 Roberts, J E H, 82
 Robertson, J D, 581
 Robins, C R, 532
 Robinson, J M, 390
 Robinson, W W, 182
 Roche, M N, 473
 Rohonci, G, 597
 Romano, N, 217
 Rome, R McK, 557
 Rose, B, 475
 Rose, D L, 577
 Rose, T F, 239
 Roseman, L, 190
 Rosenquist, H, 366
 Ross, J A, 377
 Ross, M L, 562

 Rossbach, A F, 265
 Rossi, C, 472
 Rossignoli, L, 583
 Roth, H, 364
 Rothschild, N S, 332
 Rowlands, R A, 383
 Rueggsegger, J M, 89
 Ruggieri, E, 244
 Rupp, J J, 401
 Russell, D S, 214
 Russell, H, 320

 Sabatini, G, 166
 Saland, G, 472
 Salem, W, 316
 Sanchez Toledo, P, 570
 Sandler, B P, 47
 Santoianni, G, 157
 Saphir, O, 528
 Satterfield, G H, 307
 Satterthwaite, R W, 562
 Savarese, E, 23
 Scadding, J G, 580
 Scarborough, H, 78, 473
 Schaer, H, 473
 Schattenkerk, J C P, 236
 Schaumann, J, 498
 Schenck, S G, 291, 589
 Scherer, H J, 17
 Scherschever, D, 446
 Schmidt, E C H, Jr, 102
 Schmidt, E R, 432
 Schmitz, H E, 293
 Schnedorf, J G, 588
 Schneehagen, H, 249
 Schneider, L, 89
 Schroeder, C H, 453
 Schulte, A, 436
 Schultze, K W, 156
 Schulze, W, 480
 Schwartz, E Y, 504
 Seed, L, 394
 Segelman, S Y, 327
 Seids, J V, 184
 Serebrennikoff, L V, 42
 Severin, E, 568
 Shackelford, R T, 362
 Shaffer, J M, 399
 Shambaugh, G E, Jr, 518
 Shanin, A P, 72
 Shanks, S C, 181
 Sheehan, H L, 60
 Sheehan, J F, 293
 Sheldon, C P, 251
 Shipman, S, 420
 Shrader, J C, 345
 Shumacher, H B, Jr, 586
 Siebner, M, 162
 Siedek, H, 312
 Siegling, J A, 67
 Silla, T, 66
 Simpson, W M, 577
 Singer, J J, 220
 Sjogren, S E, 331
 Skjva, K, 551
 Skinner, C, 360
 Smelovsk, V, 491
 Smith, A Del, 68
 Smith, A F, 70
 Smith, D W, 427

 Smith, F R
 Smith, P H
 Snell, A M
 Snell, G D
 Snezhkoff, V 42
 Snook, L C
 Solomon, E 445
 Sommer, R
 Songo, W
 Sosnyakov, 434
 Sovena, E
 Spatoliano, 144
 Spence, H 55
 Spier, L C 40
 Spinelli, A, 597
 Spoto, P, 2
 Stansfield, 13
 Starkoff, O
 Starr, A, 4
 Stauffer, H 360
 Steer, A, 3
 Stelling, F 98
 Stenstrom, 32
 Stenstrom, 35
 Stephens, F 34
 Stepin, S A
 Stevens, B
 Stevens, J 17
 Stewart, C 94
 Stieve, H
 Stokes, A 18
 Stone, H B
 Stone, R S
 Storch, T von, 315
 Storck, A 19, 482
 Stout, R A
 Stracker, O
 Strandquist 292
 Strassmann, 245
 Strauss, E, 399
 Strauss, H
 Strumia, M 489
 Stucki, A
 Stuppy, C
 Sugarbaker, 310
 Sundelin, F
 Sutherland, 60
 Sutherland, 287
 Swinburne, 5
 Swingle, W 400
 Sydenstrick P, 394

 Tabanelli, 31
 Taiana, J
 Tarafa, J P
 Taylor, E
 Taylor, F, 296, 399
 Taylor, H
 Taylor, N 83
 Teahan, R 495
 Teed, R W
 Tejerina Pringham, W, 541
 Tempesta, 55
 Tencon, D
 Tesonere, 37, 433
 Thoma, K 11, 415
 Thomas, C 82
 Thompson, V, 264
 Thompson, 78

 Thompson, J E, 435
 Thompson, W B, 252
 Thyssen, E, 541
 Timozzi, F P, 190
 Tolhurst, J C, 273
 Torpin, R, 448
 Touroff, A S W, 32
 Trabucco, A, 347
 Tragerman, L, J, 220
 Traut, H F, 549
 Treite, P, 55
 Trueta, J, 574
 Tsvetkov, V P, 86
 Tuci, P, 142
 Tuggle, A, 143, 591
 Turner, G, 482
 Turner, T B, 164

 Uchiyama, H, 329
 Udesky, H L, 394
 Uhle, C A W, 63
 Upjohn, W G D, 167
 Urban, V, 564
 Uruburu, J V, 263
 Urnst, M R, 73, 363

 Vaccarezza, R F, 504
 Valle, G, 154
 Vanggaard, T, 522
 Van Nes, C P, 361
 Varco, R L, 535
 Vargas, L, 553
 Vasschtschinsky, N A, 421
 Vaughan, J, 368
 Vener, H I, 280
 Verhoeff, F H, 308
 Verneti, L, 497
 Vignes, H, 342
 Vitkin, S F, 432
 Voegel, A, 249
 Vogt, J H, 67

 Wakeley, C P G, 383
 Walker, E, 399
 Walker, G F, 497
 Wallden, L, 589
 Wallis, O, 55
 Walsh, J C, 574
 Walsh, M N, 352
 Walter, R I, 292
 Walters, W, 441
 Warren, S, 389
 Warnock, W D, 457
 Wassersug, J D, 361
 Waters, E T, 383
 Watson, R A, 128
 Wattenberg, C, 522
 Webb-Johnson, Sir A, 99
 Weber, M R, 576
 Weil, P G, 475
 Weinberg, J A, 161
 Weinberg, L I, 322
 Weinberger, L M, 318
 Weintraub, S, 143
 Welch, C E, 143
 Wenzl, H, 477
 Werner, A A, 49
 Westermarck, N, 494
 Westman, A, 19

| | | | |
|---------------------|----------------|-----------------|------------------------|
| Wett dal P 366 447 | Willi T A | Woodh u D L 5 2 | Zolling r R 24 |
| Wheeler W K 346 | Wilso D | Woods P W 86 | Zopff G 367 |
| Whitby L E H 87 368 | Wilso G | Wright I S 533 | Zu k rma S 269 |
| White B 579 | Wilson J | Wulff H B 123 | Zuelch 7 |
| Whit E C 46 | Wilson J S 342 | Yoffey J M 3 3 | Chem th py for I f |
| Widm n B P 290 | Wilso P | Yorih d T 49 | tio s D as s and Oth |
| Wessma A 50 | Winfield J 6 | Young B R 9 | Infectio Circular Lett |
| Wander O 366 | W th T K | Y ung H H 362 | N 8 p 3 9 |
| Wile U J 96 | Wolf J E | Y ng N 518 | Fifty Years f Surgery |
| Willard D F P 73 | Wolff W | Yu ch A M 389 | Re w of th Fiftieth |
| Williams A C 49 | Wolfso S 9 | | A rary N mbe p 9 |
| Willms H I 5 9 | Wood G O | | |
| Willms W 10 | Woodhall | Zikee V 77 | |

